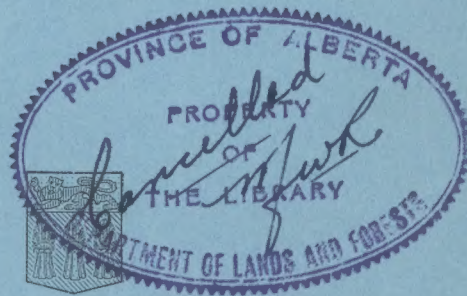


J.A. Campbell

REPORT
of the
LAND USE STUDY

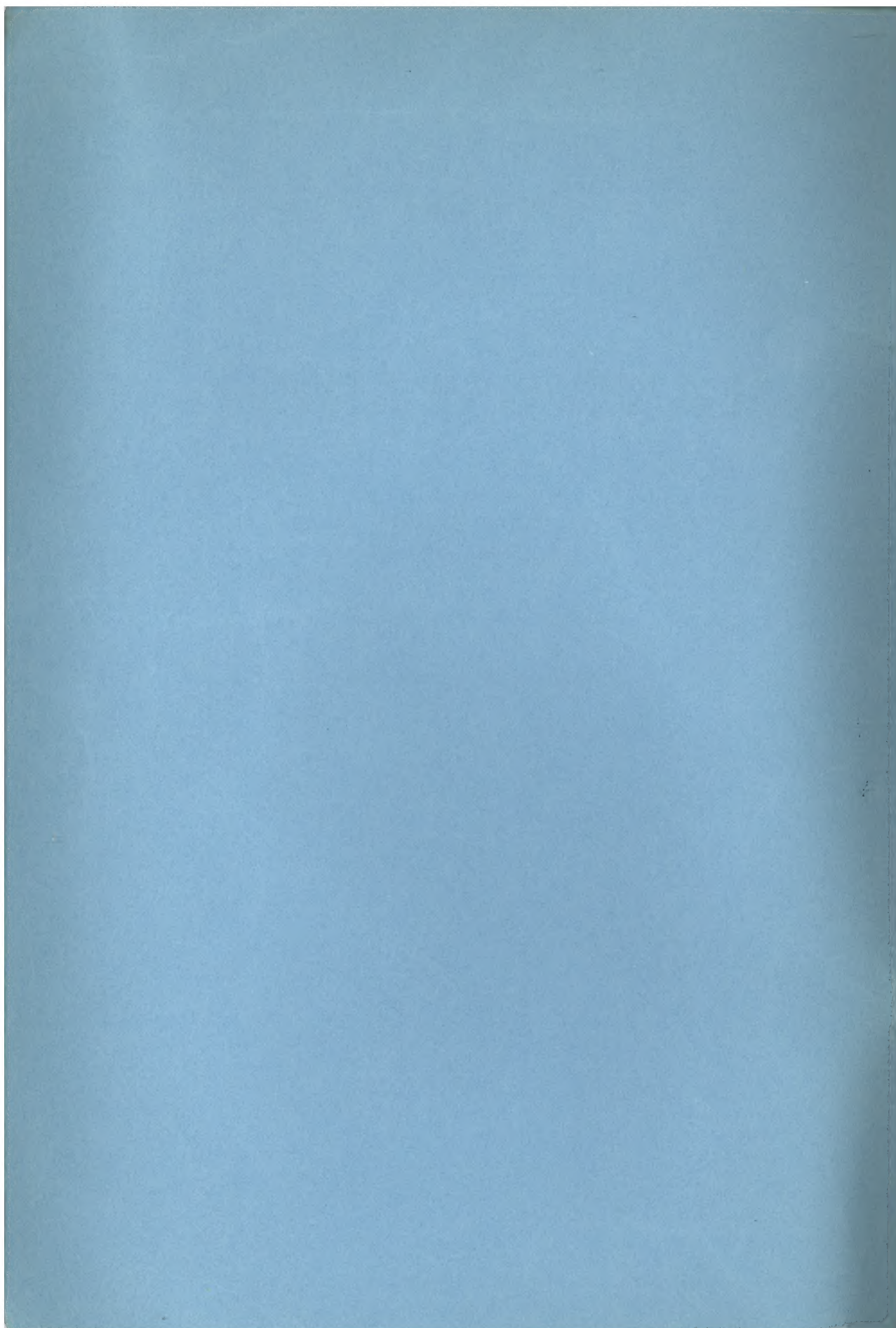
Made in 16 rural municipalities contiguous
to Swift Current, Sask.

by the
LAND USE COMMITTEE



REGINA:
THOS. H. MCCONICA, KING'S PRINTER
1949





65⁰⁰

REPORT

of the

LAND USE STUDY

Made in 16 rural municipalities contiguous
to Swift Current, Sask.

by the

LAND USE COMMITTEE



REGINA:
THOS. H. MCCONICA, KING'S PRINTER
1949



Terms of Reference

The "Terms of Reference", which guided the work of the Land Use Committee, were outlined at a meeting held in Regina, on April 5th, 1945. These were presented by the Honourable Mr. L. F. McIntosh, Minister of Agriculture, Province of Saskatchewan.

Under instruction from the Minister, the Land Use Committee was directed to:

1. Assemble all information now available relating to land use within a designated 16 municipality block.
2. Study and analyze the data available.
3. Collect additional information needed to present a careful report on the condition of agriculture in the designated area.
4. Recommend projects and methods of implementing them on the basis of the information assembled, so that sound plans can be formulated to guide the course of agriculture in Southwestern Saskatchewan.

Members of Land Use Committee

Formed April 5, 1945.

L. B. THOMSON, Chairman,
Superintendent, Dominion Experimental Station, Swift Current, Sask.

L. M. OGILVIE, Vice-Chairman,
Supervisor, Agricultural Representative Service, Swift Current, Sask.

J. B. CAMPBELL
Dominion Experimental Station, Swift Current, Sask.

G. N. MUNRO
Water Rights Branch, Department of Natural Resources, Regina, Sask.

H. VAN VLIET
Department of Farm Management, University of Saskatchewan,
Saskatoon, Sask.

HERB WIEBE
Representing Saskatchewan Stock Growers, Herbert, Sask.

Acknowledgments

The Committee wishes to place on record the valuable work contributed by those listed below:

DR. S. E. CLARKE	A. McLEAN
E. W. TISDALE	W. A. HUBBARD
T. E. WILLIS	A. C. BUDD

Dominion Experimental Station, Swift Current, Sask.

R. A. STUTT	C. B. HAVER
M. E. ANDAL	J. G. DOBSON
T. H. ASKIN	A. J. STRAUTMAN

Economics Division, Dominion Department of Agriculture, Saskatoon, Sask.

B. H. KRISTZANSON	S. KLACH
-------------------	----------

Department of Farm Management, University of Saskatchewan, Saskatoon, Sask.

J. A. ARNOT

Director of Lands, Department of Agriculture, Regina, Sask.

A. M. THOMSON

Lands Branch, Department of Agriculture, Regina, Sask.

D. NEILSON

Agricultural Representative Service, Department of Agriculture, Swift Current, Sask.

Without the assistance of these workers, it would not have been possible to present this report.

The Committee wishes also to acknowledge the valuable advice given from time to time by Dr. Auld, formerly Deputy Minister of Agriculture, Regina. Also, the help given by his staff in the preparation of material for this report.

Others who assisted in discussions included.

W. L. Jacobson, P.F.R.A., Regina, Sask.

J. A. Switzer, P.F.R.A., Swift Current, Sask.

M. J. Peace, P.F.R.A., Regina, Sask.

The valuable assistance and whole-hearted co-operation of the Municipal Councils and Secretaries within the area where the study was undertaken are acknowledged. The services these officers have provided have added greatly to this report.

Table of Contents

I—INTRODUCTION	11
II—HISTORY OF THE AREA	13
Development of Agriculture Since Settlement	
Production of Field Crops and Livestock	
Population and Social Services	
Municipal Revenue	
III—THE AGRICULTURAL RESOURCES	17
Soils	
Climate and Soil Moisture	
Irrigation Development	
Economic Classification of Land	
IV—AGRICULTURAL AID TO RURAL MUNICI- PALITIES	21
Agricultural Aid and Direct Relief	
The Prairie Farm Assistance Act	
Wheat Acreage Reduction	
Prairie Farm Income	
Prairie Farm Rehabilitation Act	
Summary of Agricultural Aid	
V—DISPOSITION OF LAND	27
Improved and Pasture Lands	
Vacant and Abandoned Land	
Public Lands Available for Lease	
VI—SERVICES TO AGRICULTURE	32
VII—PROCEDURE FOR LAND USE STUDY	32
Analysis of Rural Municipalities	
Economic Study	
Survey of Non-Cultivated Lands	
Water Conservation Studies	
Other Problems	
Municipal Councils	
VIII—SUMMARIES OF LAND USE REPORTS FOR THE RURAL MUNICIPALITIES OF CHAPLIN AND WEBB, AND A BLOCK SURVEY OF SIX RURAL MUNICIPALITIES INCLUDING COULEE NO. 136, SWIFT CURRENT NO. 137, WEBB NO. 138, EXCELSIOR NO. 166, SASKATCHEWAN LAND- ING NO. 167 AND RIVERSIDE NO. 168	35
IX—LIVESTOCK PRODUCTION PROBLEMS	66
X—GENERAL	71
The Swift Current Creek Irrigation Project	
The Reaction of Rural Municipal Councils	
XI—RECOMMENDATIONS	74
Recommendations for the 16 Municipality Study Area	
General Recommendations	
XII—APPENDIX I	81
XIII—APPENDIX II	93
XIV—APPENDIX III	96

List of Tables and Figures

TABLES

	Page
1—Grain production and number of improved acres in 16 Rural Municipalities in Southwestern Saskatchewan by Census Years.....	15
2—Livestock populations of 16 Rural Municipalities in Southwestern Saskatchewan.....	16
3—Acreage and percentage of all land in each land class for 16 Rural Municipalities in Southwestern Saskatchewan ...	20
4—Total relief and Agricultural Aid paid to 16 Municipalities in Southwestern Saskatchewan by years since 1919 ..	22
5—Total payments made under the terms of the P.F.R.A. by 16 Municipalities in Southwestern Saskatchewan by years since 1939.....	23
6—Total wheat acreage reduction bonuses paid to 16 Municipalities in Southwestern Saskatchewan since 1941.	24
7—Summary of types and number of small water development projects constructed in the 16 Rural Municipalities, also financial assistance paid by P.F.R.A. since 1935.....	25
8—Summary of Agricultural Aid provided to 16 Municipalities in Southwestern Saskatchewan since 1919.	26
9—Percentage of improved and pasture land and total assessed acreage according to land class for each municipal unit in 16 Municipalities in Southwestern Saskatchewan	28
10—Unoccupied land, vacant or abandoned in 1945 and occupied lands in 16 Municipalities in Southwestern Saskatchewan.	30
11—Disposition of public lands in 16 Municipalities in Southwestern Saskatchewan, March 1945	31
12—Land utilization in the Rural Municipality of Chaplin No. 164	36
13—Ownership of land in the Rural Municipality of Chaplin No. 164	42
14—Land Use in the Rural Municipality of Webb No. 138 as at September 1st, 1945	45
15—Land ownership in the Rural Municipality of Webb No. 138 by quarter section parcels.....	48
16—Land utilization in acres within six Rural Municipalities in Southwestern Saskatchewan.....	51

17—Land utilization in percentage within six Rural Municipalities in Southwestern Saskatchewan.....	52
18—Vegetational associations and types, their percentages and associated soil types in six Rural Municipalities in Southwestern Saskatchewan	54
19—Percentage of grass acreage in each use class, and average utilization for each municipality within six Rural Municipalities in Southwestern Saskatchewan	55
20—Degree of pasture utilization on different soil types in Southwestern Saskatchewan	56
21—Grazing capacity in terms of acres per cow-month (C/M) and animal units (A.U.) per six-month grazing season in six Rural Municipalities in Southwestern Saskatchewan.....	58
22—Yield per acre in pounds of forage and average grazing capacity in acres per cow-month (C/M) on six soil types in Southwestern Saskatchewan.	58
23—Suggested areas for community pasture development in six Rural Municipalities in Southwestern Saskatchewan .	60
24—Precipitation Records.	82
25—Frost-Free Periods from 1923 to 1946, inclusive	84
26—Yield Records of Cereal and Forage Crops on Dryland .	85
27—Wheat Yields Following Summerfallow Substitutes .	87
28—Rates of Seeding in Pounds Per Acre	88
29—Yields Obtained From Fertilized and Unfertilized Fields	92

Figures

	Page
1—Map of the 16 Municipalities in Southwestern Saskatchewan, Land Use Study, 1945	14
2—Land Utilization in the Rural Municipality of Chaplin No. 164	37
3—Land Ownership in the Rural Municipality of Chaplin No. 164	38
4—Occupancy and Tenure in the Rural Municipality of Chaplin No. 164	39
5—Relationship between the estimated grazing capacity and livestock numbers by townships in the Rural Municipality of Chaplin No. 164	41
6—Land Utilization in the Rural Municipality of Webb No. 138	46
7—Relationship between the estimated grazing capacity and livestock numbers by townships in the Rural Municipality of Webb No. 138	47

Plates

1—Results of grazing at 40 and 20 acres per head at the Dominion Range Experiment Station, Manyberries, Alberta	67
2—Precipitation at Swift Current, 61 years 1886-1946	83

**Rural Municipalities in Southwestern Saskatchewan
Included in the Study Conducted by the
Land Use Committee**

Rodgers No. 133	Morse No. 165
Shamrock No. 134	Excelsior No. 166
Lawtonia No. 135	Saskatchewan Landing No. 167
Coulee No. 136	Riverside No. 168
Swift Current No. 137	Eyebrow No. 193
Webb No. 138	Enfield No. 194
Wheatlands No. 163	Vermilion Hills No. 195
Chaplin No. 164	Maple Bush No. 224

I — Introduction

Since 1913, the farming problems of Southwestern Saskatchewan have been the concern of the Saskatchewan Government, the Dominion Government and the Rural Municipalities. The bountiful years of 1915 and 1916 gave every encouragement to those settlers who had recently homesteaded in the southwest. However, the drought years of 1917, 1918 and 1919 brought many problems to the people and to the governments. The situation became so critical that in 1920 the Saskatchewan Government appointed a "Better Farming Commission" to study agricultural problems in the affected area. After much study, the Commission presented a report in September 1920. Among the recommendations were the following points:

- (1) Experimental and research work to study drought and related problems.
- (2) Immediate programs of soil, economic and water surveys.
- (3) The organization of an adequate Extension Service.

Since 1920 these recommendations have been carried out. The Dominion Experimental Station at Swift Current was initiated immediately and research studies in soil moisture and agronomic problems were instituted. A soil survey was begun by the University of Saskatchewan. The Saskatchewan Department of Agriculture organized a more adequate Agricultural Representative Service. In later years surveys of ground and surface water were undertaken. Economic surveys were also undertaken in most of the area. A survey was made of the non-arable lands and those lands that had been abandoned for farming. Over a period of 25 years much valuable information has been compiled. It has been possible to learn more of the agricultural resources of the Southwest and how the vagaries of climate influence the welfare of the rural population and the possibilities of production.

Since the above information, coupled with the experience of farmers, was available the Saskatchewan Government believed the time was appropriate to make a further study to determine a permanent land use plan. Rather than select a large area for the study, it was decided to select an area of 16 municipalities contiguous to Swift Current, the centre of the Drought Study of 1920 (refer to Figure 1). There were several reasons for this selection. Among them were:

- (1) Drought problems had been acute for many years (1914-1938).
- (2) The Dominion Experimental Station, Swift Current, had been operating for 25 years.
- (3) An irrigation project had just been initiated for the irrigation of some 25,000 acres.

(4) All forms of Agricultural Aid have been necessary, such as seed and feed assistance, P.F.A.A., etc.

(5) It was a typical area to study and would constitute an excellent example for further Land Use Studies in the Province.

The Saskatchewan Government appointed a small committee to undertake the study. The first meeting of the Committee was held on May 24th, 1945, when the Terms of Reference were reiterated by Dr. F. H. Auld, Deputy Minister of Agriculture. The Committee set up the mechanics of procedure immediately and the different phases of work were carried out in 1945.

The Committee has kept close contacts with all Municipal Councils. A special meeting was held with all Reeves and Secretaries. Plans for study and preliminary results were presented to the meeting for a critical appraisal. During the winter of 1945-46, a special meeting was held with each Municipal Council to review the results of the Study and to make plans for future organization work.

This report contains the results of the Land Use Study to date. There is still much to be done. The Committee believes that future work involves the co-ordinated effort of all Dominion and Provincial Services, together with the assistance of Municipal Councils and other civic organizations. Further the Committee suggests that members and co-ordinating officers appointed to the Land Use Committees in the future have sufficient time to attend to the duties that the work involves.

II — History of the Area

DEVELOPMENT OF AGRICULTURE SINCE SETTLEMENT

Settlement within the 16 municipal block commenced during the late eighties when livestock raising began to assume considerable importance. Many ranches were established in the ensuing years; also grazing was carried on within the area by large ranch companies operating from distant headquarters. Many of these ranches still exist, and particularly those that were established on the non-arable lands with rougher topography or with sandy soils.

The ranchers depended largely on open range for wintering cattle during the first few years they operated. However, they soon realized that reserves of feed were necessary and made provisions for such. Considerable acreages of dryland were cropped for this purpose. Irrigation projects were also developed and, according to Canadian Irrigation Surveys issued in 1896, some 79,271 acres were under the ditch in Southern Alberta and Western Assiniboia. A large portion of this acreage was devoted to the production of feed reserves.

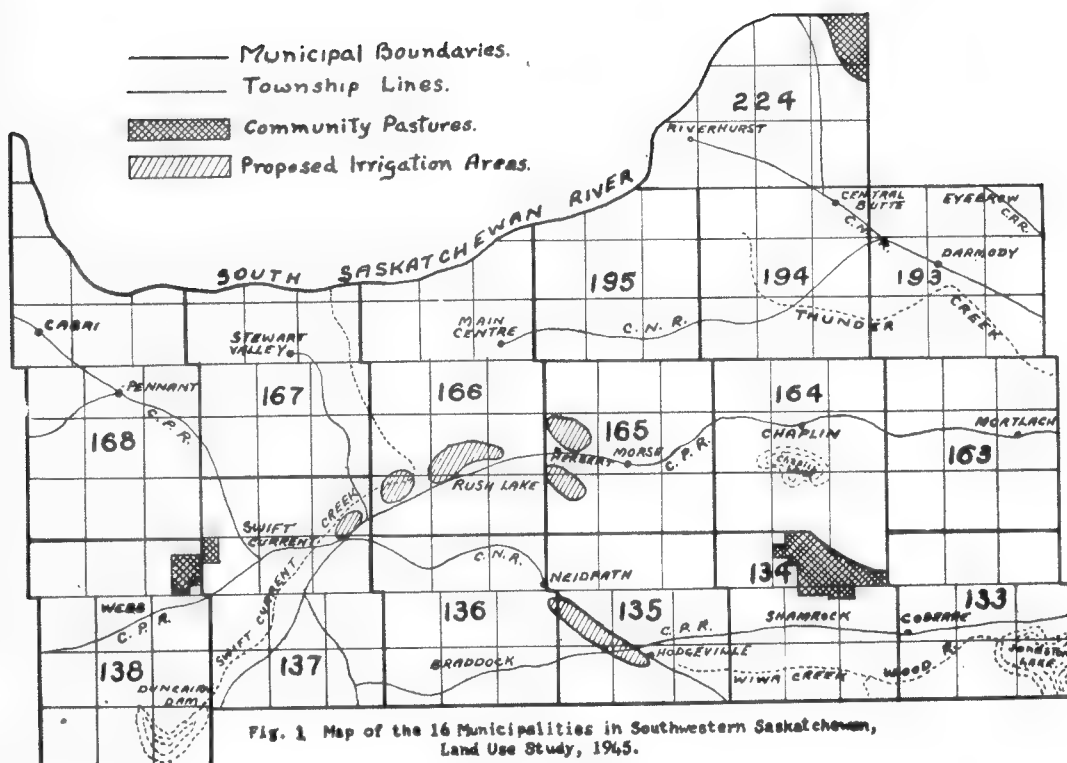
Homesteading for dryland farming started shortly after 1900. Settlement commenced adjacent to the main line of the Canadian Pacific Railway, while lands further removed were settled between that date and 1912. The demand for food during World War I, together with increased prices for farm products, brought about a great increase in cultivated acreage during the years 1915 to 1919.

Settlement moved from the east to the west of the area. Municipalities like Webb No. 138 and Riverside No. 168 were later in their development than those like Rodgers No. 133 and Wheatlands No. 163. Active organization of school districts started about 1905 and continued until 1915. Municipal development of roads began during the period from 1908 to 1914, depending on the location of the municipality concerned. Medical services on the whole have been good and, in general, a doctor has been available within a distance of from 40 to 50 miles ever since settlement started.

PRODUCTION OF FIELD CROPS AND LIVESTOCK

The large yields of wheat in 1915 and 1916 contrasted sharply with the poor crop years of 1914, 1917, 1918 and 1919. These years established at an early date the extremes of bountiful production in some years, followed by longer periods of poor crops or outright failure, which has been so typical of the area ever since.

From data supplied by the Statistics Branch, Saskatchewan Department of Agriculture, the following observations can be made and which are applicable to the area under study. This information summarizes the value of wheat sold per farm, average yield and average price per bushel in Crop District No. 3 for the period 1916 to 1935, inclusive:



- (1) The value of marketable surplus wheat per farm for the period 1922-28, inclusive, averaged \$2,400.00; the average yield of wheat was 19 bushels per acre, which sold for approximately 94 cents per bushel.
- (2) The value of marketable surplus wheat per farm for the period 1929-35, inclusive, was approximately \$400.00; an average yield of wheat of about 5 bushels per acre was obtained, which sold for approximately 53 cents per bushel.
- (3) The 20-year average yield (1916-35) amounted to 12.3 bushels of wheat per acre; the average value of the marketable surplus wheat amounted to \$1,294.00.

Yields vary greatly from year to year. This condition is illustrated in Table 1, which shows the total production of grains by census years.

TABLE 1

Grain Production and Number of Improved Acres in 16 Rural Municipalities in Southwest Saskatchewan by Census Years

Year	Wheat	Barley	Oats	Rye	Flax	Improved
	Bus.	Bus.	Bus.	Bus.	Bus.	Acres
1916...	10,571,500	368,400	7,860,500	.....	584,700	1,299,337
1920 ..	8,260,333	139,070	2,925,984	80,041	.....	1,716,105
1926...	14,880,048	272,272	3,521,309	296,137	.....	1,852,968
1931..	3,002,900	102,600	1,035,900	44,200	.....	2,189,079
1936...	4,719,700	104,500	1,168,000	148,800	31,200	2,073,244
1941 ..	2,020,100	264,000	629,200	155,700	47,800	.....

In 1926, a good crop year, 1,852,968 acres of cropland produced a total of 18,969,766 bushels of grain, while in 1931, 2,189,079 acres produced only 4,185,600 bushels of grain. The average production in 1926 amounted to 10 bushels per acre compared to only two in 1931.

In 1937, the driest year on record, a complete crop failure resulted; an average yield of 0.4 bushels per acre was obtained. This failure necessitated the importation of fodder from British Columbia, the Eastern Provinces and the United States in order to meet the minimum feed requirements for livestock in this and surrounding areas.

The resultant forced liquidation of cattle on farms during 1937 so lowered cattle production that by the next census year (1941) the population of cattle had only reached a total slightly higher than it was in 1916.

Table 2 shows this change in livestock population by census years.

TABLE 2
Livestock Populations of 16 Rural Municipalities in Southwest Saskatchewan

Year	Horses	Cattle	Sheep	Swine
1916	54,747	41,053	2,915	27,042
1920 . . . . .	.....	.....	.....	.....
1926 . . . . .	.....	.....	.....	.....
1931	51,876	44,439	15,323	27,391
1936	40,556	58,978	20,693	19,394
1941	28,715	47,665	24,011	17,186

NOTE:—No information in 1920 and 1926.

The complete failure of 1937 ended the 9-year drought period. A number of good crops in succeeding years, together with increased prices for all farm products, have improved the general financial conditions of the farmers and the district.

In common with the rest of the Brown Soil Zone, insects have on many occasions taken a severe toll of crops. The insects of economic importance have been sawflies, grasshoppers, pale western cutworm and wireworms. Insect control must of necessity become an important part of agricultural cropping practices if losses are to be avoided.

POPULATION AND SOCIAL SERVICES

Population increased rapidly from about 1905 to 1915 and continued, although less rapidly, up to the beginning of the drought period in 1929. In 1931, the population was 28,084 and by 1941 it had decreased to 23,159. A further reduction has occurred since the last census. The decrease is attributable to the drought of the thirties, mechanization of farms and to the movement of farm boys into the Canadian Armed Forces during World War II.

The main line of the Canadian Pacific Railway extends through the area from east to west, while many branch lines serve the areas to the north and south. These branch lines connect with the main line at Swift Current and Moose Jaw.

Provincial Highway No. 1 runs through the area paralleling the main line of the Canadian Pacific Railway. Highway No. 4 traverses the western portion of the area from north to south. A second north and south highway goes through Hodgeville, Morse, Chaplin and Riverhurst. The area is not well supplied with market roads, and new equipment is now being purchased by municipalities for purposes of road construction and maintenance. Highway Nos. 1 and 4 are the only all-weather roads in the area.

The region is relatively well supplied with schools and churches. Telephone services are provided to many communities. Power lines pass through a very small portion of the area and power is not yet a

factor in rural development. Many small urban centers are without medical and hospital services, and depend on the services available at Moose Jaw and Swift Current.

MUNICIPAL REVENUE

Tax levies for municipal purposes remained nearly constant over a period of 23 years (1921 to 1944). Eleven municipalities had a lower tax levy in 1944 than in 1922; five had a higher levy. Municipalities generally have had difficulty in financing, although some periods have been easier than others. With the aid of fair crops and increased prices for farm products, the municipalities have liquidated much of their debts in recent years. Not only have debts been reduced, but bank balances and investments averaged about \$36,000.00 per municipality in December, 1945.

III — The Agricultural Resources

SOILS

The area contained within the 16 municipality block was studied by the Department of Soils, University of Saskatchewan, as part of a province wide survey. The prime purpose of the study was to classify and map, as well as examine the physical and chemical nature of the soil, so that guidance would be available to obtain the best utilization of the several soil types within the province. The following information about the soil summarizes the important findings of the Saskatchewan Soil Survey in relation to the area selected for study.

The area is located largely in the Brown Soil Zone. It is characterized by a rolling topography, by grassland vegetation, by the absence of trees and by the frequency of drought. The cultivated lands are devoted mainly to grain production, while the non-arable lands are used for grazing purposes.

Seven of the eight soil associations of the Brown Soil Zone are found in the area. These are the Haverhill, Echo, Chaplin, Hatton, Fox Valley, Sceptre and Wood Mountain associations. Approximately six townships in the northeast corner of the area lie within the Dark Brown Soil Zone and are composed largely of loams and light loams of the Weyburn association. The Cypress association, also of the Dark Brown Soil Zone, extends into the south-western portion of the area for some 40 miles; it is an eastward extension from the Cypress Hills.

The textures of the several soil associations vary greatly. Representatives of each textural class are found, including sand, sandy loams, loams, clay loams and heavy clays. Loams make up the largest single class and these blend into adjoining areas of light loam, silt loam and clay loam. Sandy districts are found mainly west of Swift Current between the main line of the Canadian Pacific Railway and the Empress Line, as well as around Chaplin Lake, Mortlach and in the Riverhurst-Elbow district. Heavy clay soils extend from the northwest corner into the area for a distance of about 40 miles; these are adjacent to the Saskatchewan River.

The nitrogen content of the soil in the area is higher than it is for the Brown Soil Zone as a whole, but lower than the nitrogen

content of the other soil zones of the Province. Nitrogen content increases progressively in the Dark Brown and Black Soil Zones to the east and north of the area, corresponding to the increasing moisture efficiency and heavier grass cover observed in passing from the shortgrass to mixed grass prairie and "Parkland".

CLIMATE AND SOIL MOISTURE

Moisture is the principal factor limiting crop production. This statement is applicable to all land whether or not cultivated. Although the total yearly precipitation at Swift Current averages nearly 15 inches, it has varied from a low of 8.26 inches (1937) to a high of 24.55 inches (1891). Extremes may occur in successive years as in 1927 and 1928, when the precipitation amounted to 23.13 and 12.13 inches, respectively.

Seasonal precipitation varies greatly also. The average for the period April to July, inclusive, amounts to approximately 8 inches, slightly more than one-half of the average annual precipitation. During the 61 years that records have been kept, a seasonal low of 2.48 inches (1937) and a seasonal high of 14.09 inches (1909) have been reported. These variations in annual and seasonal rainfall are illustrated in the chart entitled "Precipitation at Swift Current" (Appendix 1, page 81).

The evaporation rate is high. At Swift Current the average evaporation from a free-water surface amounts to approximately 30 inches during the summer season from May to September, inclusive. Further, although the precipitation-evaporation ratio is about 1:2, the ratio varies greatly. During years of low rainfall and high temperatures, the P:E ratio will be greater than 1:4, while during seasons of heavy precipitation the P:E ratio may not be greater than 1:1.

The mean annual temperature is 38 degrees Fahrenheit. This varies from a mean high of 64.4 degrees Fahrenheit in July to a mean low of 7.8 degrees Fahrenheit in January. During the warmest days the temperature may rise above 100 degrees Fahrenheit, while during the coldest winter weather temperatures of below -45 degrees Fahrenheit have been recorded. Although the mean summer temperature is not excessively high, short periods of excessively hot weather occur and usually during periods of low rainfall and when soil moisture supplies are low. These factors adversely affect seed setting and seed development of cereal crops. Again, although the mean low temperature is not excessively cold, there are periods of extremely cold weather when livestock cannot be kept on winter pasture.

Because moisture is the principal factor limiting crop production, and because extreme variations in both annual and seasonal precipitation can be expected, all cultural practices need to be directed toward conserving moisture in the soil. Experiments indicate that the most productive soil classes are those which have high moisture-holding and moisture-retaining characters, providing other factors (fertility, slope, stoniness, drainage, etc.) are of equal or near equal value. More recent investigations indicate that a crop may obtain 50 per cent. or more of the water it uses from reserves stored in the

soil at seeding time. Thus, cultural practices which increase moisture reserves will assist to overcome some of the adverse effects of a variable climate, as well as increase moisture supplies for plant growth during years of low precipitation.

IRRIGATION DEVELOPMENT

Irrigation development needs to be designed to meet two requirements, firstly water conservation, and secondly stabilizing dryland farming and livestock programs.

Within the area one large project, the Swift Current Creek, has been partially completed. In addition, some farm projects varying in size have been developed and are in operation. Survey results indicate that there are no other large projects which are irrigable by gravity storage systems. However, there are numerous small storage projects which can be developed; these are located throughout each of the 16 municipalities.

Despite the lack of sites for large scale irrigation schemes from storage, there are several sites that need investigation to consider their adaptability for spring-flood irrigation. Included in this category are areas adjacent to Wood River, Lake Chaplin, Lake Johnstone, Thunder Creek, Wiwa Creek, Swift Current Creek and others. The possibility of pumping plant development needs further investigation, particularly in areas adjacent to all water courses.

Large projects are valuable but those of even greater importance are the small sites scattered over the upland. These may be dams and dugouts for irrigation or stock watering, dykes to spread water on slopes, ditches connecting sloughs to control and concentrate runoff, and other types of development.

More intensive surveys to consider the adaptability of the topography to different types of development will be required. Surveys are also needed during the winter and early spring to study the volume of water that can be conserved. Preliminary results from surveys undertaken in Chaplin and Webb Municipalities suggest that only a small portion of the surface supplies are being retained.

The self help policy of water conservation administered under the Prairie Farm Rehabilitation Act appears to meet the requirements for small water development. The objectives of the large development program are water conservation and stabilizing the production of dryland agriculture. No present policy appears to provide sufficient inducement for farmers to co-operate in the development of these projects. The returns are small in relation to the cost of development and charges made to farmers for getting water to their land need to be assessed against the objectives of the program rather than against individual benefits.

It is considered advisable in all irrigation development that the program of land levelling and land preparation be organized, whereby services of Government Departments and of Rural Municipalities can be co-ordinated in a plan that will serve the individual farmer on a cost basis.

ECONOMIC CLASSIFICATION OF LAND

The basis for the economic classification of land is in terms of wheat production. All parcels have been classified as follows:

Land Class 1—

Submarginal for wheat production—350 bushels of marketable wheat per quarter section per year, or less. This class includes most of the non-arable land.

Land Class II—

Marginal for wheat production—from 351 to 475 bushels of marketable wheat per quarter section per year.

Land Classes III, IV and V—

Suitable for wheat production—over 475 bushels of marketable wheat per quarter section per year.

Thus the class into which a parcel of land has been placed indicates the degree of its utility for wheat production. While land is classified on a quarter section basis, its rating has been premised on two assumptions, firstly that it forms part of a farm of average size (three-quarters of a section), and secondly that the typical management, organization and cultural methods are practised on it.

Generally the lighter textured soils with poor moisture holding capacity fall into Land Class I, while the Brown Soil Zone loams and clay loams usually range in Classes II and III according to stoniness and topography. Land Class IV is represented in the area by Fox Valley silty clay loam and Cypress loam. The only land in Class V is the Sceptre heavy clay.

Table 3 indicates the acreage of the various classes.

TABLE 3

**Acreage and Percentage of all Land in Each Land Class for
16 Rural Municipalities in Southwestern Saskatchewan**

Land Classes	*Acres in Area	Per Cent.
Land Class I (Submarginal) .. .	1,303,210	37.2
Land Class II (Marginal) .. .	642,958	18.4
Land Class III (Supramarginal) .. .	1,151,552	32.8
Land Class IV (Supramarginal) .. .	351,979	10.0
Land Class V (Supramarginal) .. .	56,300	1.6
Total .. .	3,505,999	100.0

*—Acreages presented in this table are those supplied by the assessment figures on municipal tax rolls. In connection with certain other studies referred to in this report, the acreage basis was taken to be 160 acres per quarter section. A slight difference in total acreages is caused by the use of these different standards in the following tables.

IV — Agricultural Aid to Rural Municipalities

Agricultural aid has been advanced by the Dominion and Provincial Governments to rural municipalities within the 16 municipality block. During the years from early settlement until 1935, the assistance was granted according to the need of a district in any particular year. Since 1935, when the Prairie Farm Rehabilitation Act was passed, there has been a more orderly approach to the problem of rural aid. This Act, together with the Prairie Farm Assistance Act, has tended to change the form of assistance from one depending on need, to one which encourages development of rural land. The several types of assistance, together with the amount of aid given, are discussed briefly.

It is worthwhile pointing out that, although the farmer was the direct recipient of the aid extended, the community as a whole participated in this assistance. Because of the buying power created, business remained solvent, professional men and women were compensated for their services and labour was paid for what it had to offer. Without purchasing power in the hands of the primary producer, all transportation, wholesale, retail, professional and labour interests would have suffered far beyond their actual discomfitures. Although the farm population will be the principal section of the community affected by programs of better land use, all groups, which together form a community, are affected vitally. Better use of lands will be achieved when all groups understand the problem and are prepared to act together to obtain the desired end.

AGRICULTURAL AID AND DIRECT RELIEF

The history of agricultural aid dates back to 1908. At that time the Dominion Government assumed certain responsibilities, and made seed grain advances to the value of \$892,517.87 in Saskatchewan. Again in 1914-15 an advance of \$8,655,698.41 for seed grain, fodder and relief was made. The amounts of these advances made to the 16 municipalities concerned could not be ascertained, but no doubt substantial sums were paid. In 1919 a guaranteed bank loan was made to the rural municipalities for seed grain. While this loan was quite substantial, it did not in any way correspond to the huge amounts which were paid out in later years. From 1920 to 1929 small guaranteed loans were made from time to time to certain of the municipalities for such items as the purchase of seed grain for the upkeep of school districts and for Municipal Relief. However, it was in 1929 that assistance payments to municipalities reached sizable proportions for the first time. From 1929 to 1943 assistance was given to all the municipalities concerned, the largest amount being paid during the year 1937-38 when \$4,337,954.36 were distributed amongst the 16 municipalities.

The following table shows the amounts paid to the 16 municipalities since 1919.

TABLE 4
Total Relief and Agricultural Aid Paid to 16 Municipalities
in Southwestern Saskatchewan by Years Since 1919

Year	Advance Made
1919-20	\$ 551,888.43
1920-21	1,565.00
1921-22	4,042.00
1922-23 . . . . .	.....
1923-24 . . . . .	.....
1924-25	9,941.35
1925-26 . . . . .	.....
1926-27...	233.34
1927-28 . . . . .	.....
1928-29 . . . . .	.....
1929-30	192,771.34
1930-31	568,342.96
1931-32	2,130,616.79
1932-33	454,735.61
1933-34	1,828,413.08
1934-35	1,923,097.88
1935-36	403,701.06
1936-37	1,448,012.51
1937-38	4,337,954.36
1938-39...	1,177,133.43
1939-40	202,772.30
1940-41	144,779.45
1941-42...	47,372.66
1942-43... . . . .	.....
1943-44 . . . . .	.....
Total.....	\$ 15,427,373.55
..... No payments.	

Of the total amount of relief advanced, \$1,293,513.73 had been repaid by the municipalities concerned by December 31st, 1945. Further reductions through cancellations, totalling \$8,805,180.16, were made from 1919 to 1938 by the Government. This reduced the total overall debt of the 16 municipalities to \$5,328,679.66. However, the significant fact remains that had not these cancellations been made, the debt owing to relief would have been \$14,133,859.82. Further, had the sum of \$805,461.71 paid these municipalities for Relief Road Work been added, the total cost, less repayment, would have amounted to \$14,939,321.53. The figures for cancellations of relief made during the period from 1939 to 1945 were unavailable. These advances are not repayable in all instances, particularly in the case of the Dominion Government's contributions

for direct relief and for feed, fodder and seed grain supplies. However, whether repayable or not, this assistance was advanced to alleviate the distressing effects of drought and other hardships.

THE PRAIRIE FARM ASSISTANCE ACT

The history of the Prairie Farm Assistance Act (1939) has been relatively short. Under the terms of the Act, the Governor-General in Council can:

- (1) Declare any crop year an "Emergency Year", and/or
- (2) Upon application from the Government of the Province of Saskatchewan, declare a "Crop Failure Area", when 171 townships or more in the Province have an average yield of 5 bushels or less per acre.

(Amended June 27, 1947 and April 23, 1948 and awards are now made on the basis of the average yield of a Township in which application for assistance has been made by the Rural Municipality or by the government of the province in the case of local improvement districts.)

Payments amounting to from 10 cents to \$2.50 per acre are made depending upon yields within a township, the kind of year declared, the price of wheat, the limits of payments allowed under the Act, as well as other factors. A farmer may obtain this assistance on one-half of this cultivated acreage. A deduction of 1 per cent. is made from all grain sold by farmers to purchasing agents. Substantial payments were made to farmers in the 16 municipalities under the terms of this Act as indicated in Table 5. Conversely, considerable amounts have been paid by farmers in the district to the P.F.A.A. fund.

TABLE 5

**Total Payments Made Under the Terms of the P.F.A.A. to
16 Municipalities in Southwestern Saskatchewan
By Years Since 1939**

Year	Payment Made
1939-40.	\$ 448,130.32
1940-41	736,974.86
1941-42	1,899,657.50
1942-43.. . . .	.....
1943-44	556,393.21
1944-45	23,655.00
1945-46	1,264,361.00
Total	\$ 4,929,171.89
. No Payments made.	

While these payments may not be considered as a direct relief measure, they may be considered to be a form of agricultural aid, because more relief might have been required had they not been paid. The amount of \$4,929,171.89, which has been paid to farmers in

this area, under the terms of the Act, indicates the amount of assistance which has been necessary because of low and variable yields since 1939.

WHEAT ACREAGE REDUCTION

First payments of bonuses for wheat acreage reduction were made by the Federal Government to farmers of these municipalities in 1941-42 and continued until 1943-44. This assistance was designed to take wheat out of production on farms and to substitute either coarse grains, grasses and legumes, or summerfallow. Amounts of bonuses paid to farmers in the 16 municipalities concerned are presented by years in Table 6.

TABLE 6
Total Wheat Acreage Reduction Bonuses Paid to 16
Municipalities in Southwestern Saskatchewan
Since 1941

Year	Bonus Paid
1941-42	\$ 1,473,816.69
1942-43	667,082.00
1943-44	965,298.00
Total	\$ 3,106,196.69

This assistance was designed primarily to encourage the production of coarse grains and livestock. Nevertheless, it was a form of agricultural aid, because it encouraged farmers to adopt soil conservation practices.

PRAIRIE FARM INCOME

Prairie Farm Income (P.F.I.) was another form of agricultural aid paid to farmers during 1941-42. This resembled a cost of living bonus, because it allowed a payment of 75 cents per acre to all farmers within the prairie provinces. Payments to farmers in the 16 municipalities under this form of assistance amounted to \$605,399.75.

PRAIRIE FARM REHABILITATION ACT

Expenditures under the P.F.R. Act, from date of inception until March 31, 1945, within the 16 municipality area, have amounted to \$738,571.18. This money has been used to develop the Swift Current Creek Irrigation Project (under construction), three community pastures, 308 dugouts, 345 domestic and stock watering dams, and 53 small irrigation projects. It is worthwhile noting the small expenditure charged to small water development projects; some 706 projects were established at a charge of only \$66,149.80 to the Dominion Government. Within the three community pastures there are grazing facilities for nearly 5,000 head of stock; some 67,200 acres have been enclosed, of which nearly 10,000 acres of abandoned farm land have been seeded to grass.

Many more small water projects will be established. To date the possibilities for development have been scratched only; it is estimated that less than 15 per cent. of the spring run-off is being stored for use. The Committee suggests that the reason why farmers have not taken greater advantage of this assistance is be-

cause they lacked capital to improve their properties until recently. The present improved financial position of the farmer will allow him to make fuller use of the facilities provided under the P.F.R. Act.

Instruction in irrigation practices has been an effective policy to obtain full utilization of irrigation development. For several years, regular inspections have been made by competent irrigators. Information about problems of irrigation, maintenance of structures and cropping practices was given to those starting irrigation farming. This leadership has been valuable and its continuation is necessary, not only to give further leadership to existing projects but also to ensure good land use on new projects.

The assistance provided for small water development under the P.F.R.A. program is presented in Table 7. It will be noted that certain municipalities have taken advantage of the assistance to a great extent, while others have made little use of the program. Excelsior R.M. No. 166 has made the greatest effort to utilize the service, having developed 131 projects. Although this development provides storage for a large supply of water, it is worthwhile pointing out that there are many more sites for water development within the municipality.

TABLE 7
Summary of Types and Number of Small Water Development
Projects Constructed in the 16 Municipalities, Also
Financial Assistance Paid by P.F.R.A. Since 1935

R.M. No.	Dugouts		Dams				Total	
			Stock- watering		Irrigation			
	No.	Payment	No.	Payment	No.	Payment	No.	Payment
		\$		\$		\$		\$
133	9	924.07	8	693.36	1	226.37	18	1,843.80
134	26	2,265.48	7	386.19	1	96.03	34	2,747.70
135	40	3,602.19	41	3,789.24	10	2,195.86	91	9,587.29
136	7	667.20	40	2,683.05	2	692.42	49	4,042.67
137	8	626.13	31	3,580.05	12	3,301.75	51	7,507.93
138	4	191.97	7	375.82	3	307.49	14	875.28
163	21	1,662.60	10	880.65	1	34.73	32	2,577.98
164	6	385.03	3	127.16	2	178.57	11	690.76
165	33	2,647.94	34	2,693.91	3	529.37	70	5,871.22
166	43	3,736.80	78	6,412.73	10	1,869.01	131	12,018.54
167	1	23.79	3	289.44	2	188.24	6	501.47
168	15	989.49	18	1,354.87	2	309.99	35	2,654.35
193	15	1,384.33	6	435.12	1	350.00	22	2,169.45
194	38	4,122.14	15	1,297.63	2	204.74	55	5,624.51
195	24	1,670.12	39	3,126.55	1	279.18	64	5,075.85
224	18	1,920.94	5	440.06			23	2,361.00
Total	308	26,820.22	345	28,565.83	53	10,763.75	706	66,149.80

SUMMARY OF AGRICULTURAL AID

Large sums have been paid to the 16 municipalities in the form of agricultural aid. Table 8 summarizes the total amount of monetary assistance which has been provided to the municipalities of this area since 1919.

TABLE 8
Summary of Agricultural Aid Provided to 16 Municipalities
In Southwestern Saskatchewan Since 1919

Type of Assistance	Amount Paid
Direct and indirect relief advanced	\$ 15,427,373.55
Payments for relief road work	805,461.71
Payments made under the P.F.A.A.	4,929,171.89
Payments made for W.A.R.	3,106,196.69
Payments made under P.F.I. arrangements	605,399.75
Payments made under P.F.R.A.	
Small water development	66,149.80
Community pastures	94,042.34
Swift Current Creek Irrigation Project	578,379.04
Total Payments Made	\$ 25,612,174.77

The new assessment of Saskatchewan, begun in 1939, shows the total assessed valuation of farm land in the 16 municipalities to be \$28,112,681.00. The grand total of agricultural aid advanced to the end of 1945 amounts to \$25,612,174.77. This figure is for assistance but not for school grants, municipal road grants, etc., which would be in addition to this amount. Thus the total assessed valuation of all agricultural land in the area is only \$2,500,506.23 greater than the amount which has been paid out in agricultural aid since 1919.

The reasons for the advancement of agricultural aid and bonuses are many and varied. From the information shown in this section of the report, it is suggested that the spending of money for land use planning would be in the best interests of the nation. It is believed that payments of direct and indirect agricultural aids in particular areas of doubtful crop producing ability only intensifies the problem for farmers in the future. In addition, the Committee believes that it will be difficult for the nation to justify such large payments during future years. Therefore, the Committee believes that the time is opportune for the Saskatchewan Government to review this situation and plan to direct the spending of government moneys towards a Land Use plan.

Despite the fact that a considerable sum of money has been expended to assist agriculture, nevertheless agricultural production has exceeded the expenditure by many times. A tentative estimate of agricultural production within the 16 municipalities during the 26-year period (1919 to 1944) amounts to over \$200,000,000.00, nearly eight times the amount of the assistance granted. In other words, for every \$12.00 that the country invested in the 16 municipalities, some \$100.00 worth of agricultural wealth was returned to the nation.

It is worthwhile emphasizing again that, although the assistance was given to agriculture, it assisted every resident and every business within the area. Not only did it maintain the health and the standards of living of the people, but it ensured the solvency of the primary industry and those who service that industry.

V — Disposition of Land

A total acreage of 3,505,999 acres is included in the 16 municipalities. Refer to Table 3, page 20, for its classification on the basis of wheat production. It will be noted that over one-half of the land, 55.5 per cent. is classified as being either unsuitable or questionable for wheat production when farms are of three-quarter sections or less in size.

During the summer months of 1937, 1938, 1939 and 1940 parts of this area were included in the annual survey of the Dominion Economics Division in co-operation with the Department of Farm Management, University of Saskatchewan. Prior to this work, aerial photographs were taken by the Royal Canadian Air Force. These were mainly of the oblique type, although in the latter years photographs of the vertical type were taken. Use of these aerial photographs was made in obtaining a complete land pattern of each quarter section, which indicates the boundaries of cultivated parcels and other physical features.

IMPROVED AND PASTURE LANDS

A record of the acreage of improved and pasture lands was obtained from municipal tax rolls and the files of the Economic Division. These records are summarized in Table 9, where the percentages of improved and unimproved land and the acreages in each land class are presented for all municipalities. In addition, the total percentage of improved and unimproved land and the total acreage in each municipality is stated.

Amongst the important points brought out by the data presented in Table 9 are the percentages of improved land in each land class. For the 16 municipalities as a unit it is established that for:

Land Class I —28.6% or 372,107 acres are improved.

Land Class II —72.3% or 464,771 acres are improved.

Land Class III —88.5% or 1,019,143 acres are improved.

Land Class IV —96.6% or 340,148 acres are improved.

Land Class V —98.7% or 55,562 acres are improved.

These data indicate that farmers have made a good job of screening out the good quality land, but have been less critical where poor quality land was concerned. Considerable variations in the percentage of improved land within each land class between municipalities is indicated; the range is as follows:

TABLE 9
Percentage of Improved and Pasture Land and Total Assessed Acreage According to Land Class for Each Municipal Unit in 16 Municipalities in Southwestern Saskatchewan

Number of R.M.	Land Class																	
	I			II			III			IV			V			All Land Classes		
	Imp- roved	Pas- ture	Total	Imp- roved	Pas- ture	Total	Imp- roved	Pas- ture	Total	Imp- roved	Pas- ture	Total	Imp- roved	Pas- ture	Total	Imp- roved	Pas- ture	Total
	%	%	Acres in 000's	%	%	Acres in 000's	%	%	Acres in 000's	%	%	Acres in 000's	%	%	Acres in 000's	%	%	Acres in 000's
1937 Survey																		
	No. 133	10.5	89.5	92	60.5	39.5	16	81.9	18.1	42	95.5	4.5	27	45.1	54.9	177		
	No. 163	31.7	68.3	113	81.2	18.8	47	86.7	13.3	38	97.1	2.9	7	55.3	44.7	205		
1938 Survey																		
	No. 134	33.3	66.7	52	61.0	39.0	36	84.4	15.6	79	97.2	2.8	18	66.8	33.2	185		
	No. 135	25.3	74.7	23	68.2	31.8	33	88.7	11.3	114	97.8	2.2	36	80.0	20.0	206		
	No. 164	27.7	72.3	131	68.4	31.6	30	87.8	12.2	21	99.1	0.9	2	41.9	58.2	184		
	No. 165	24.7	75.3	73	71.4	28.6	33	88.5	11.5	81	97.1	2.9	17	63.7	36.3	204		
1939 Survey																		
	No. 136	22.8	77.2	56	63.9	36.1	34	88.2	11.8	81	96.5	3.5	35	67.7	32.3	206		
	No. 137	35.5	64.5	78	67.5	32.5	45	89.2	10.8	86	96.8	3.2	60	71.7	28.3	269		
	No. 138	38.7	61.3	124	76.3	23.7	40	86.4	13.6	53	98.0	2.0	52	65.2	34.8	269		
	No. 166	19.3	80.7	88	63.9	36.1	55	85.9	14.1	123	95.3	4.7	30	63.0	37.0	297		
	No. 167	18.3	81.7	54	64.6	35.4	42	86.0	14.0	79	93.4	6.6	13	63.8	36.2	197		
	No. 168	33.4	66.6	111	75.6	24.4	54	86.2	13.8	67	95.7	4.3	46	68.9	31.1	318		
1940 Survey																		
	No. 193	46.9	53.1	47	83.7	16.3	33	95.1	4.9	110	98.2	1.8	9	82.6	17.4	205		
	No. 194	29.6	70.4	53	73.5	26.5	53	91.8	8.2	100	...	...	6	71.0	29.0	206		
	No. 195	13.1	86.9	98	71.8	28.2	31	90.4	9.6	32	...	...	...	39.6	60.4	161		
	No. 224	42.1	57.9	110	88.2	11.8	61	94.8	5.2	46	...	...	...	66.3	33.7	217		
Total ...	28.6	71.4	1,303	72.3	27.7	643	88.5	11.5	1,152	96.6	3.4	352	64.2	35.8	3,506			

Land Class I—

From 10.5% in R.M. No. 133 to 46.9% in R.M. No. 193.

Land Class II—

From 60.5% in R.M. No. 133 to 88.2% in R.M. No. 224.

Land Class III—

From 81.9% in R.M. No. 133 to 95.1% in R.M. No. 193.

Land Class IV—

From 93.4% in R.M. No. 167 to 99.1% in R.M. No. 164.

Land Class V—

From 98.4% in R.M. No. 168 to 100.0% in R.M. No. 166.

VACANT AND ABANDONED LAND

In 12 Rural Municipalities, for which the information on vacant and abandoned land was completed in 1945, the proportion of land area occupied was about 97 per cent. except in the Rural Municipalities of Chaplin No. 164 and Wheatlands No. 163. In these only 83.8 and 84.8 per cent. respectively of the land area was occupied.

The breakdown of unoccupied land shows that about an equal percentage was either vacant or abandoned in the Rural Municipality of Chaplin, while about three-quarters of the unoccupied lands in the Rural Municipality of Wheatlands was abandoned for crop production. The breakdown of occupied and unoccupied land is presented in Table 10.

TABLE 10
Unoccupied Land, Vacant or Abandoned in 1945 and Occu-
pied Lands in 16 Municipalities in Southwestern
Saskatchewan

Number of • R.M.	Unoccupied						Occupied		Total	
	Vacant*		Abandoned†		Total					
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
1937 Survey										
No. 133.....	4,079	2.3	2,529	1.4	6,608	3.7	170,248	96.3	176,856	100.0
No. 163.....	8,465	4.2	22,560	11.0	31,025	15.2	173,601	84.8	204,626	100.0
1938 Survey										
No. 134.....	4,803	2.6	5,910	3.2	10,713	5.8	173,811	94.2	184,524	100.0
No. 135.....	960	0.5	640	0.3	1,600	0.8	204,493	99.2	206,093	100.0
No. 164.....	15,515	8.4	14,389	7.8	29,904	16.2	154,124	83.8	184,028	100.0
No. 165.....	5,014	2.4	4,000	2.0	9,014	4.4	195,439	95.6	204,453	100.0
1939 Survey										
No. 136.....	235	0.1	160	0.1	395	0.2	205,794	99.8	206,189	100.0
No. 137.....	1,303	0.4	1,496	0.6	2,799	1.0	266,109	99.0	268,908	100.0
No. 138.....	3,080	1.1	1,760	0.7	4,840	1.8	264,696	98.2	269,536	100.0
No. 166.....	1,165	0.4	2,400	0.8	3,565	1.2	293,181	98.0	296,746	100.0
No. 167.....	4,237	2.2	1,280	0.6	5,517	2.8	191,479	97.2	196,996	100.0
No. 168.....	1,280	0.4	320	0.1	1,600	0.5	316,721	99.5	318,321	100.0
1940 Survey										
No. 193.....	Not Completed									
No. 194.....										
No. 195.....										
No. 224.....										

*—Vacant —Unoccupied with less than 20 acres cultivated per quarter section at any one time.

†—Abandoned —Unoccupied with more than 20 acres cultivated per quarter section at any one time.

PUBLIC LANDS AVAILABLE FOR LEASE

A total of 523,104 acres of land within the 16 municipalities are under the control of the Lands Branch, Department of Agriculture.

Table 11 shows the disposition of these lands in March, 1945.

TABLE 11
Disposition of Public Lands in 16 Municipalities in
Southwestern Saskatchewan, March, 1945

Type of Disposition	Acres	Acres
Leased Land—		
Ranches (mainly 21-year lease).....	272,220	
Leases (mainly 5-year).....	81,536	
Pasture permits (mainly annual)....	14,204	
Cultivated land (mainly 5-year lease) ..	23,020	
Grazing land (mainly 5-year lease)....	8,566	
Total Under Lease		399,546
Other Land—		
Sale (contracts in process of alienation)	47,733	
Community pasture.....	12,645	
Vacant (available for lease)	63,180	
Total		123,558
Total (all lands)		523,104

The Provincial Lands will be disposed of by lease only for the purpose to which each parcel is best suited. The usual tenure of leases will be for a period of 33 years, with the provision for renewal reserved to the lessee. Any lease which is issued will be subject to revision at any time and from time to time, if for any reason the economy of the district in which it is situated warrants any change in the terms and conditions thereof.

Land suitable for grain production will be leased at a rental of from one-sixth to one-eighth share of crop, depending upon the productivity of the land. Land suitable for grazing will be leased at a rental commensurate with the quality and quantity of the grass produced, co-ordinated to the grass land economy with which it may be identified, i.e., ranching, farm grazing or mixed farming.

The lessee will be responsible for the payment of any and all taxes levied.

Any buildings and other improvements erected and effected by the lessee shall belong to and be removable by the lessee at any time during the term of the lease. Upon the expiry of termination of the lease, the lessee may accept the offer of his choice for the purchase of the improvements for which he is responsible.

A primary objective in the leasing of Provincial Land will be to withhold and, wherever possible, withdraw from cultivation lands marginal or submarginal for grain production. It will be the aim to encourage and, if necessary to assist, regrassing for hay or pasture land under cultivation which is submarginal for grain production.

VI — Services to Agriculture

Dominion and Provincial Governments have provided many services for the welfare of the people. During years of drought and depression, agricultural services have been increased greatly to meet these situations as they have arisen. The several services provided by governments and industry are listed and presented in Appendix 2 of this report. A study of the list indicates that many services are available to farmers. Not only are they numerous, but they cover a wide field of agricultural interest. There is no doubt that all of the service organizations have agricultural betterment as their prime objective.

To achieve agricultural improvement, a better land use plan is required. If such is to be successful, the Committee believes that more co-ordination of these services is desirable. Further the Committee believes that these services needs be directed through a central agency in order to obtain a sound and stable agricultural industry. Once the principle of land use planning is established, then it becomes the responsibility of all services to direct their efforts toward implementing any planned program, and this irrespective of the effect it may have on the individual service or agency. In the expenditure of government and private funds for agricultural service, more consideration must be given to co-ordination of service if the best Land Use plan is to materialize.

VII — Procedure for Land Use Study

ANALYSIS OF RURAL MUNICIPALITIES

The municipality was selected as the study unit, and all available information relating to each was assembled. Soil and ground water supply survey reports were secured. The results of economic studies were obtained. Histories of financial assistance, as well as those of settlement and movements of settlers, were secured. Records of land tenancy were available. With this information, a study of land use in each municipality was commenced.

However, in reviewing the information available for Land Use planning, it was found that there was insufficient to present an immediate report. Consequently further investigational work was outlined, which was to be completed during the summer of 1945. This involved certain economic studies, grazing studies of non-cultivated lands, water conservation surveys and contacts with the Municipal Councils to acquaint them with the purpose and nature of the work.

The area outlined by the Minister of Agriculture for Land Use study was found to be too large for detailed investigations during the summer of 1945. Consequently it was decided that the work should be concentrated in two municipalities. The two selected were Webb No. 138 and Chaplin No. 164. These were chosen because they represented one of the better and one of the poorer municipalities within the area from the viewpoint of agricultural prosperity.

From the work completed in 1945, it was obvious that further investigation was required before a final report could be presented. The areas studied were so different in their productive capacities that the results obtained did not give a clear general picture. Consequently it was decided that five other municipalities would be studied in detail during the summer of 1946. These included the Rural Municipalities of Coulee No. 136, Swift Current No. 137, Excelsior No. 166, Saskatchewan Landing No. 167 and Riverside No. 168. These municipalities are located in a block adjacent to Swift Current.

ECONOMIC STUDY

The additional economic studies which were considered to be essential included surveys to determine ownership and occupancy of all lands within the 16 municipalities, with special studies to be undertaken in selected municipalities.

The phases of the Economic Study and the objectives related to each phase may be outlined as follows:

1. Occupancy and ownership surveys of 12 municipalities.

(1) OCCUPANCY SURVEY:

- (A) To indicate the manner and extent of utilization of the land area.
 - (a) Showing the extent of use of problem areas in the form of marginal and submarginal parcels.
 - (b) Identifying areas of unoccupied lands, particularly those in larger areas which might permit desirable pasture development.
- (B) To show the existing pattern of farm units in relation to the land area.
 - (a) To indicate the distribution of farms and identify areas of non-cultivated land adjacent.
 - (b) To permit an appraisal of the comparative adequacy or inadequacy of existing farms from the standpoint of type of land, size of unit and type of farming.

(2) OWNERSHIP SURVEY:

- (A) To indicate the pattern of land ownership, particularly in relation to problem areas which might involve adjustments and to areas which might permit pasture development.

- (B) To identify problem factors in land ownership limiting adjustments toward adequate and desirable farm units.

2. Grazing Surveys in Rural Municipalities Chaplin No. 164 and Webb No. 138.

- (1) To provide a detailed survey of the utilization of grazing lands in two representative areas which might be indicative of the problems of grazing land use for the larger study area.
 - (A) To indicate the distribution of grazing land use among existing operators and the comparative extent of use by various operators.
 - (B) To indicate the character of utilization of grazing lands in terms of comparative over or under-utilization and identify problem factors affecting and limiting grazing uses.
 - (C) To furnish general information on grazing practices and livestock management for studying the comparative contributions of grazing uses to farm returns and the relationship of livestock enterprises in the farm unit.

3. Business survey of selected farm units throughout study area representative of various types of farming.

- (1) To show the requirements of adequate economic units in terms of areas of land and sizes of livestock enterprises for various grades of land, and for various combinations of dry-land, irrigated land and grazing land.
- (2) To relate the requirements of economic units to the needs for adjustments in various areas in terms of settlement adjustments, farm unit and type of farming adjustments, and improvements in productivity, distribution and efficiency of use of the various types of land resources.

SURVEY OF NON-CULTIVATED LANDS

The work on non-cultivated lands was to be concentrated in the selected municipalities. This was to consist of determining the boundaries of vegetational types, to estimate the grazing capacity of the municipalities, to map the areas of overgrazing, to correlate the present livestock population with the actual grazing capacity, and to determine location for pasture development.

WATER CONSERVATION STUDIES

It was planned that water conservation studies should be undertaken in the Rural Municipalities of Rodgers No. 133 and Shamrock No. 134. In addition, surveys to determine run-off, its amount, its season, and its natural, as well as its developed and its undeveloped storage, were conducted in the spring of 1946 in Chaplin Municipality. Studies dealing with water storage in the soil prior to seeding time were undertaken in selected municipalities. This work was completed through the co-operation of Dominion, Provincial and Municipal agencies.

OTHER PROBLEMS

Other problems affecting the program of Land Use and about which the Committee had little or no information, were organized for study. Information was required relating to irrigation development under P.F.R.A., the extent of agricultural assistance provided by P.F.R.A., the amount of agricultural aid received by the district through seed, feed and direct relief policies, as well as other problems. Members of the Committee were charged with the collection of this information.

MUNICIPAL COUNCILS

It was decided that the Land Use Committee should make as much use as possible of the knowledge that the Municipal Officers had acquired about their respective districts. In addition, this contact would keep the Municipal Councils informed on the progress of the study. Committee members were appointed to gather any useful information which the Municipal Officers could offer and to keep these men informed about the work.

VIII — Summaries of Land Use Reports for the Rural Municipalities of Chaplin and Webb, and a Block Survey of Six Rural Municipalities Including Coulee No. 136, Swift Current No. 137, Webb No. 138, Excelsior No. 166, Saskatchewan Landing No. 167 and Riverside No. 168

The work, which was outlined at the organization meeting, was undertaken. It was found that units of one township in size were unsatisfactory to work with, because farms and ranches spread from one township to another. The same condition was observed between municipalities, but had less influence on the results than when smaller sized areas were used as sampling units. Consequently all work was organized on a municipal basis and concentrated in Chaplin and Webb municipalities during the summer of 1945, and in Coulee, Swift Current, Excelsior, Saskatchewan Landing and Riverside during 1946.

RURAL MUNICIPALITY OF CHAPLIN NO. 164

The land utilization study of the Chaplin Municipality pointed out that the land was not organized for efficient production. Reference to Table 12, which follows, will indicate how the land was being used as at July 1st, 1945. Figure 2, page 37, entitled "Land Utilization R.M. Chaplin No. 164", depicts the distribution of the different types of use. Distribution of ownership is illustrated in Figure 3, page 38, while occupancy and tenure are noted in Figure 4, page 39.

Cropland

Although nearly 30 per cent. of the acreage in the municipality is cropped, only 12 per cent. of the land is classified as Land Class III or better. Consequently nearly two-thirds of land that is cultivated is marginal or submarginal for wheat production, when included in farms of three-quarters of a section or smaller. Undoubtedly, production on this land is reducing the average yield of the municipality. A comparison between the cultivated land map and soils map indicates that there is no land suitable for cultivation other than that which is cropped at present.

TABLE 12

Land Utilization in the Rural Municipality of Chaplin No. 164

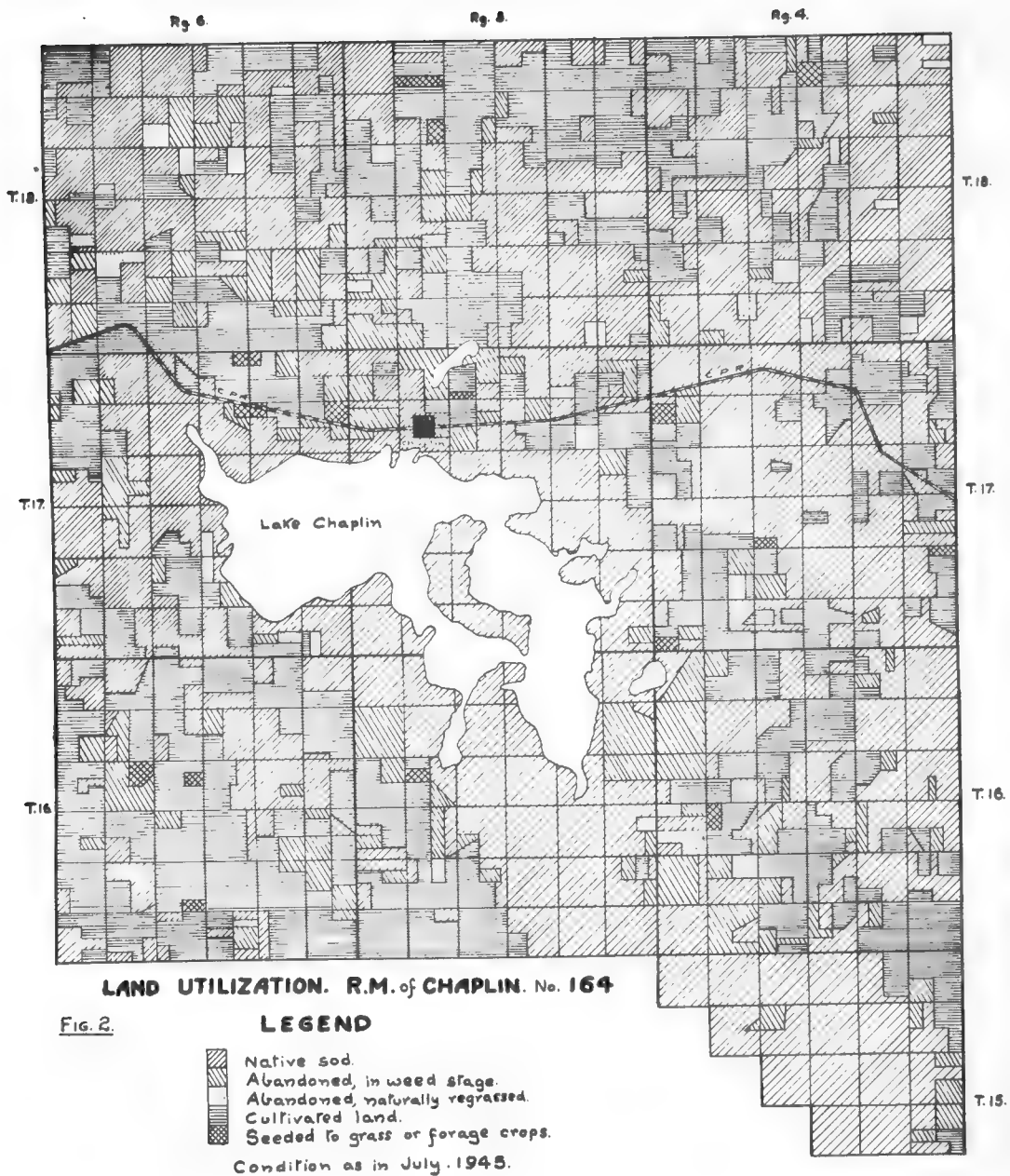
Type of Utilization	Acreage	Per-centage	Sub-Total
Native pasture	113,147	51.69	117,950
Naturally regrassed pasture . . .	3,973	1.84	
Seeded pasture.	830	0.35	
Native hay fields	514	0.25	797
Seeded hay fields	283	0.13	
Cultivated land	63,971	29.23	63,971
Abandoned land	18,953	8.65	18,953
Waste (lakes, etc.)	17,207	7.86	17,207
Total	218,878	100.00	218,878

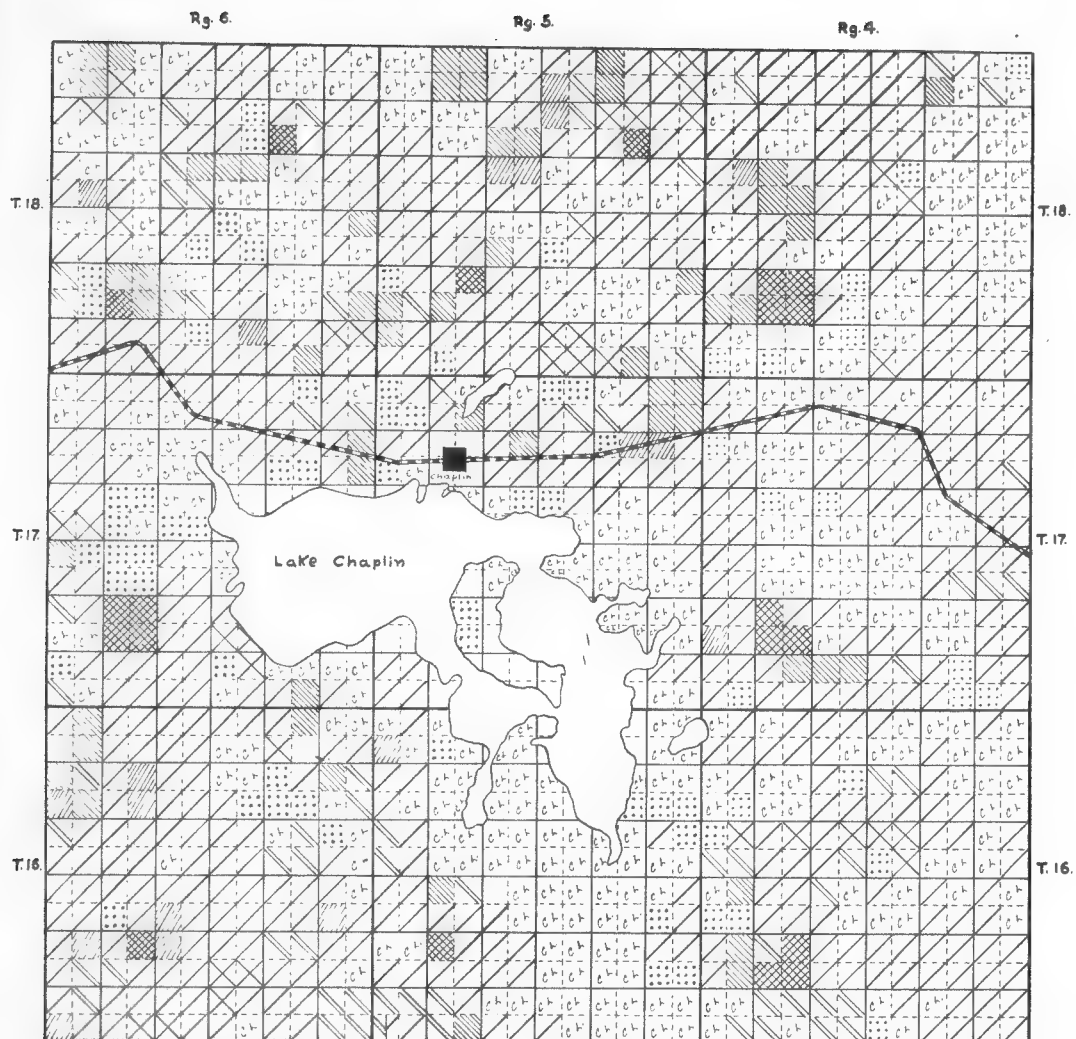
Abandoned Land

A second factor that intensifies the poor land use picture is the large acreage of abandoned farm land. Nearly 23,000 acres are so classified. Of this amount 4,000 acres have been regrassed by native species. About 15,000 acres have a cover of perennial weeds amongst which sparse stands of grass are growing. The balance, nearly 4,000 acres, is covered with annual weeds. With the exception of the 4,000 acres that have regrassed naturally, there is very little production from the abandoned lands, seldom sufficient to warrant farm operators paying rents and taxes for their use. Likewise, there is no incentive for farmers to improve these parcels by regrassing with forage crops and developing stock-watering sites.

Feed Reserves

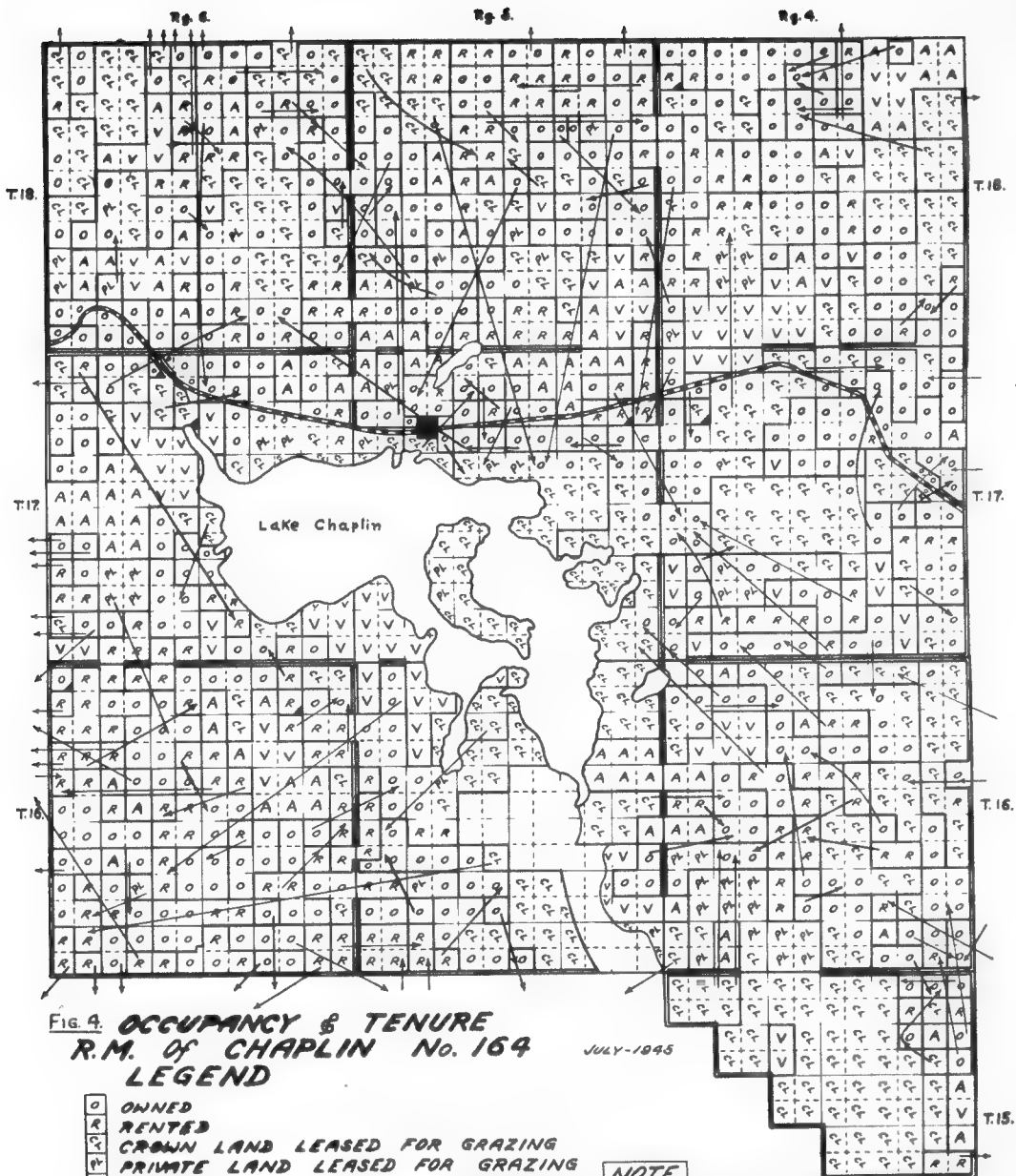
There is insufficient hay land to provide reserves of fodder for the livestock within the area. Until better provisions are made to provide feed reserves, the livestock industry will not be on a sound basis. Perennial forages grow well on the soils of the Chaplin Municipality, particularly crested wheatgrass, sweet clover, brome and alfalfa.





LAND OWNERSHIP R.M. of CHAPLIN
No. 164 JULY - 1945.
LEGEND

	OWNED BY INDIVIDUAL - RESIDENT IN LOCALITY
	" " " " IN SASK.
	" " " " IN CANADA
	" " " " OUTSIDE CANADA
	" " RURAL MUNICIPALITY
	" " HUDSON'S BAY CO.
	" " MORTGAGE COMPANIES
	CROWN LAND CONTROLLED BY LANDS BRANCH
	UNKNOWN



Pasture

There is a large acreage of native grassland, totalling nearly 118,000 acres. Of this total, it was found that 54,000 acres were being unutilized or lightly grazed, while some 25,000 acres were in an over-grazed condition. These conditions of under use and over-utilization are related to the difficulties of obtaining supplies of stock-water and reserves of winter feed, as well as lack of fencing, and the difficulties of establishing suitably sized grazing units.

Livestock Populations in Relation to Carrying Capacity

There are 3,936 cattle, 1,521 horses and 489 sheep in the municipality. These figures are equivalent to 5,468 animal units, of which 57 per cent. are cattle, 41.5 per cent. are horses and 1.5 per cent. are sheep. It appears that there are too many horses in relation to farm needs, and not enough cattle and sheep to utilize the grazing resources.

The present livestock population is approximately equal to the estimated carrying capacity of the municipality, providing grazing is practised for about eight months each year. However, there is an uneven distribution of livestock, which results in certain areas being over-utilized while others are under-grazed. This condition is illustrated in Figure 5, which shows the distribution of livestock, the estimated carrying capacity, and the condition of the pastures for each township within the municipality.

R6		R5		R4		
638(1)* 850(2)*	802(3)*	540 720	435	828 1,103	611	T-18
M(4)*		M-L		L		
422 563	363	328 437	411	647 863	743	T-17
M-L		M		M-H		
305 406	506	338 451	135	475 633	781	T-16
M-H		L		H		
				306 408	636	T-15
					H	

Fig. 5 —Relationship between the estimated grazing capacity and livestock numbers by townships in the Rural Municipality of Chaplin No. 164, July, 1945.

- (1)* Number of animal grazing units that the available pasture will carry for an eight-month period.
- (2)* Number of animal grazing units that the available pasture will carry for a six-month grazing period.
- (3)*, Number of animal grazing units per township.
- (4)* L = Under utilized. M-L = Moderately to lightly
 M = Moderately grazed. grazed.
 H = Heavily grazed; M-H = Moderately to heavily
 overgrazing evident. grazed.

Ownership and Occupancy

Ownership and occupancy studies indicate that slightly more than 50 per cent. of the land is privately owned, the balance being controlled by government agencies, mortgage companies and the Hudson's Bay Company. The ownership on the basis of quarter-section units is presented in Table 13, the distribution of these lands is shown in Figure 2, entitled "Land Utilization in the R.M. Chaplin No. 164".

TABLE 13

Ownership of Land in the Rural Municipality of Chaplin No. 164 July 1945

Type of Ownership	Number of Quarter- Section Parcels	
		Sub-Total
Privately owned by farmers living in the R.M. or within 20 miles of it	560	
Privately owned by residents of Sask.	71	
Privately owned by residents of Canada	39	
Privately owned outside of Canada	22	692
Dept. of Natural Resources	448	
R.M. Chaplin No. 164	78	
Mortgage Companies	57	
Hudson's Bay Company	20	
Unknown or not stated	6	609
Total	1,301	1,301

Of the occupied land 479 quarters were owned, 206 rented, 376 leased from the N.R.D. and 50 parcels leased from the Hudson's Bay Company and mortgage companies. There were 210 parcels of unoccupied land. This includes 23 vacant parcels in the lake channel, 16 vacant parcels along the lake shore and 76 vacant parcels in farming areas. There were 95 abandoned unoccupied parcels.

The occupancy and tenure studies show that there were 177 farm units, of which 168 were operated by residents who live on the land. The average size of farm was found to be 949 acres, comprising 447 acres owned, 234 acres rented and 268 acres leased. The average cropland acreage was 384 acres, of which 233 acres were owned and 151 acres rented.

This study corroborated the findings of the grazing survey relating to under-use of pastures. Farmers reported that lack of water and of fencing prevented them from using the grazing available. On the average, the farmers provide about one ton of hay per livestock unit as reserves for feeding; the feed consists of slough, upland, tame grass and cereal hay.

Land ownership is presented graphically in the map entitled "Land Ownership in the R.M. of Chaplin". The outstanding feature shown is the high proportion of parcels not owned by residents. Another feature of importance is the large portion owned by the Crown and the Municipality. These conditions are not common to many districts.

Figure 4 is entitled "Occupancy and Tenure". Each farm holding is marked, and outlying parcels are joined to the home property by arrows. It is not unusual for a farm operator to be working land many miles from his headquarters; this condition is common to many municipalities. Although consolidation of property would undoubtedly be a measure to obtain better land use, many farmers will be loath to exchange distant parcels, because they believe that scattered property reduces the chances for losses from hail, drought, frost and insect damage.

Discussion and Summary

These surveys indicated several economic problems which warrant consideration. These are:

1. The settlement and population history and a general appraisal of resources suggests that the total resources are inadequate, even with favourable development and uses of such resources.
2. Relatively a large proportion of farms are of inadequate size. There may be a possibility of effecting a better distribution of land among existing operators.
3. Considerable areas of vacant unoccupied parcels, unused occupied parcels, and under utilized grazing parcels suggest the possibility of obtaining improved utilization of these parcels by reseeding certain abandoned lands.
4. An awkward distribution of holdings suggests the possibility of improving the efficiency of individual farm units by greater consolidation of holdings.
5. Over utilization of grazing land in some areas suggests danger of progressive deterioration of grazing resources.

There are general remedial measures that warrant exploration:

- (1) Measures to discourage additional settlement.
- (2) Measures to improve the distribution of land resources.
 - (A) Policies for disposition of Crown and Municipal crop and grazing parcels to improve adequacy of existing undersized farm units.
 - (B) Development of neighborhood pasture areas and their allocation to provide access to grazing areas for farms with inadequate grazing resources.
- (3) Measures to provide fuller utilization of resources by means of reseeding abandoned and vacant parcels and development of water facilities where needed.

- (4) Measures to provide more efficient utilization of resources.
 - (A) Policies for control, disposition and exchange of lands to provide a better consolidation of seriously scattered farm units and to increase the size of seriously undersized farm units.
 - (B) Experimental, demonstration and other aids to encourage improvement of cultural and cropping practices and of livestock management.
- (5) Measures to guard against serious depletion of resources.
 - (A) Policies of land distribution, leasing and grazing controls, etc., to alleviate overgrazing of currently overgrazed lands.
 - (B) Policies to guard against danger of complete deterioration of lighter sandy soils relating to the ownership and control of lands, encouraging reduction of cereal cropping and strengthening cultural practices.

One point in the discussion needs enlargement, that on the development of neighbourhood and small community pastures. Scattered throughout the municipality there are blocks of land that range in size from three to ten sections. These blocks consist largely of grassland, but include some abandoned land, as well as very small areas of cultivated land. Grazing records indicate that they are under-grazed, and occupancy records show that the bulk of them are owned by the Department of Natural Resources, the Rural Municipality of Chaplin and by individuals living outside the Municipality. Tenure records show that the Crown lands are not leased, but no records are on hand to show tenure of municipal parcels.

Some blocks have been suggested for small community pasture development and other areas could be organized. Such areas might be enlarged through exchange of lands or by including leased lands adjacent to the proposed pastures.

In no way does this recommendation complete the pasture development which might be accomplished in the municipality. There are several areas of two sections in size or less, owned by public agencies, where neighbour or private development could be initiated. Until all of these isolated parcels are producing according to a planned program, the work will not be completed.

RURAL MUNICIPALITY OF WEBB NO. 138

The agricultural industry in the Rural Municipality of Webb No. 138 is fairly well organized. Lands of poorer quality have been developed into grazing units and into a Community Pasture. Seventy per cent. of the land that is cropped is classified as Class III or better. There is a small acreage of abandoned farm land, totalling

4,270 acres, or 1.5 per cent. of the municipal area. Table 14 presents the land use picture as at September 1st, 1945. The distribution of this land is shown by Figure 6, entitled "Land Utilization R.M. Webb No. 138".

TABLE 14
Land Use in the Rural Municipality of Webb No. 138 as at
September 1st, 1945

Type of Utilization	Acreage	Percentage	Sub-Total
Native pasture	86,252	31.5	
Naturally regressed pasture.	2,705	1.0	
Seeded pasture	4,425	1.6	93,382
Native hay fields	1,492	0.55	
Seeded hay fields	191	0.10	1,683
Cultivated land	171,485	61.75	171,485
Abandoned land	4,270	1.5	4,270
Waste (lakes, etc.)	5,660	2.0	5,660
Total	276,480	100.0	276,480

Abandoned Land

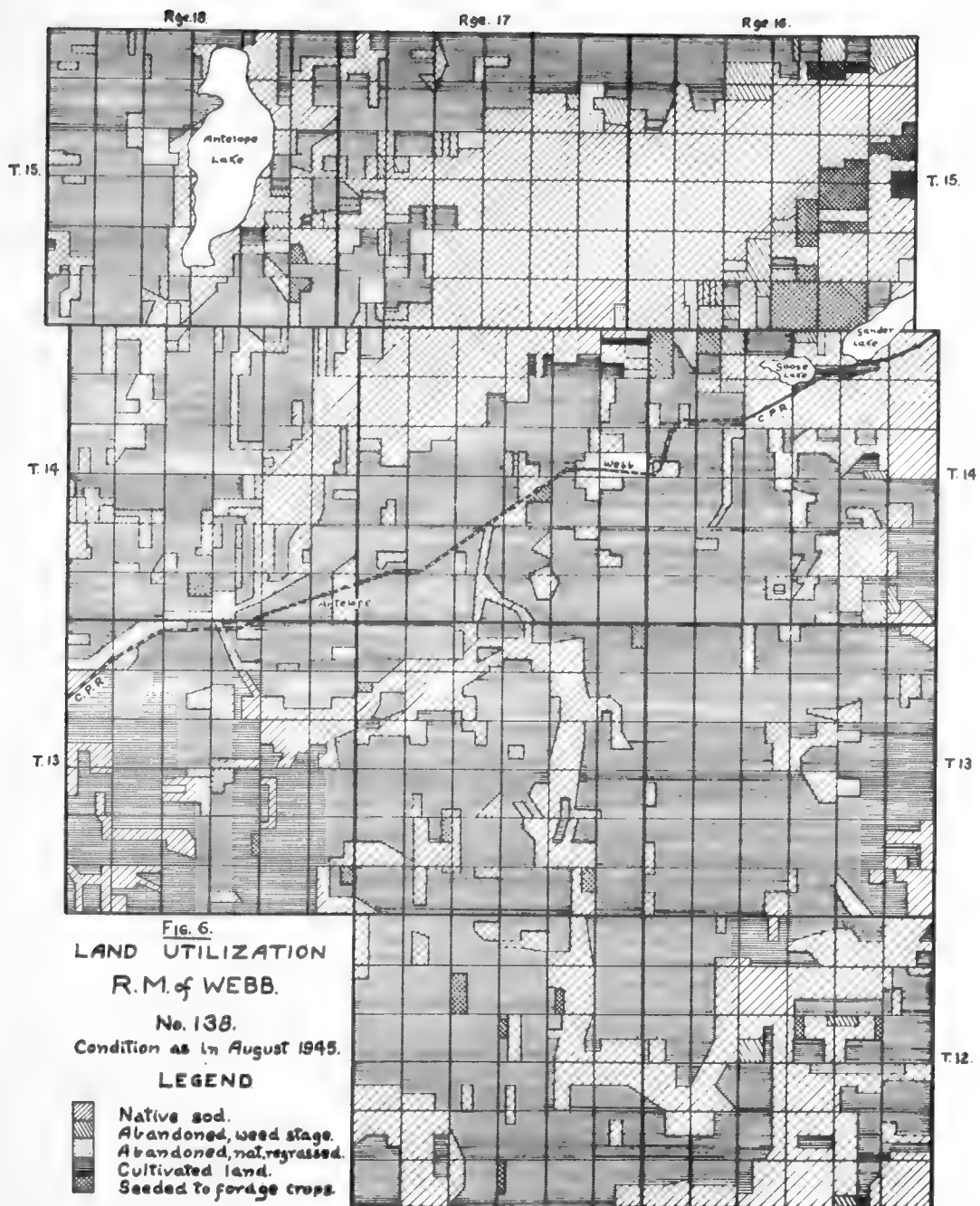
Large acreages of abandoned farm land have been seeded within the community pasture boundaries, while small parcels are located throughout the municipality. Abandoned lands, not regressed, are chiefly located adjacent to the sandhills in the northern townships, but small acreages are found throughout the entire area.

Pasture

Grazing studies indicate that certain portions of the municipality are being over utilized. This is particularly noticeable on small farm pastures. Many small regressing programs need to be started in order to increase the grazing capacity of farm units. Seedings of crested wheatgrass, or brome, with a legume on farm pasture would increase materially the carrying capacity of this land.

Livestock Population in Relation to Carrying Capacity

There are 6,950 livestock units in the municipality. To provide pasturage for this population, there are some 22,620 cow-months of grazing available. On this basis there is less than four months grazing per animal unit per year within the municipality. Since the season of grazing averages some five months, there is a heavier use of the grass than is recommended. The heavy rate of grazing practised is indicated by the overgrazed condition of many pastures. In order to provide additional grazing, more land should be added to the community pasture, particularly abandoned farm lands and unoccupied farm lands adjacent to it. Improvement of



farm pastures by reseeding would assist in balancing the grazing resources and the livestock population. There appears to be more horses than the farm demands require, and a reduction in this class of livestock is suggested. The relationship between the estimated grazing resources and the livestock population is presented in Figure 7.

R18		R17		R16		
210(1)*	442(3)*	486	411	836	829	
253(2)*		583		1,031		
M-H(4)*		M-L		M		T-15
				*		
269	612	260	525	362	788	
323		312		432		
M-H		M		H		T-14
176	256	222	892	133	456	
211		266		159		
M		H		H		T-13
193	700	233	505	367	534	
231		280		440		
H		H		M		T-12

Fig. 7—Relationship between the estimated grazing capacity and livestock numbers by Townships in the Rural Municipality of Webb No. 138, September, 1945.

- (1)* Estimated number of grazing units that the available pastures will carry for a six-month grazing season.
- (2)* Estimated number of grazing units that the available pasture will carry for a five-month grazing season.
- (3)* Number of animal grazing units per township.
- (4)* L = Under utilized. M-L = Moderately to lightly
 M = Moderately grazed. grazed.
 H = Heavily grazed; M-H = Moderately to heavily
 overgrazing evident. grazed.

It will be noted in Figure 7 that the livestock populations and the estimated grazing capacity are very far apart in certain townships. It is evident also that these conditions exist where the greatest degree of overgrazing is practised. The areas where conservative grazing is practised include the townships which contain the Community Pasture, and the lands leased for grazing purposes from the Department of Natural Resources.

Ownership and Occupancy

The ownership surveys indicate that a higher percentage of the land is privately owned than in the Rural Municipality of Chaplin. The record of land ownership in the Rural Municipality of Webb No. 138 is presented in Table 15. The distribution of ownership is indicated in Figure 6, page 46, entitled "Land Utilization R.M. Webb No. 138."

TABLE 15
Land Ownership in the Rural Municipality of Webb No. 138
By Quarter-Section Parcels, September, 1945

Type of Ownership	No. of Quarter-Section Parcels		
		Sub-Total	%
Living in R.M. or within 20 miles	1,257		73.2
Living in Saskatchewan	19		1.1
Living in Canada	99		5.8
Living outside Canada	23	1,398	1 3
Department of Natural Resources	204		11.9
Rural Municipality	28		1.6
Hudson's Bay Company	4		0.2
Railroad	1		
Mortgage and Insurance Companies	27		1 6
P.F.R.A. Community Pasture	56	320	3.3
Total	1,718	1,718	100.00

Community pasture development has assisted in re-organization of land use. The pasture is constructed on lands submarginal and marginal for wheat production, and on soils that are mainly composed of sandy loams and sand. Over four sections of abandoned farm land have been reseeded to grass and excellent stands have been obtained. This acreage represents increased grazing and reserve feed resources for the municipality as a whole. The municipal council is anxious to enlarge this community pasture project.

The average size of farm is 968 acres. Of this acreage 635 are owned, 241 rented and 92 are leased. The average acreage cropped amounts to 594 acres per farm, of this amount 420 acres

are owned and 174 rented. There are an average of 28.7 livestock units per farm, of which 60 per cent. are cattle, 20 per cent. sheep and the balance horses and pigs. Over 90 per cent. of the farms raise cattle, but the bulk of the sheep population is owned by a few ranchers.

The cattle and sheep populations are increasing, while the horse population is declining. Swine have also declined in numbers during the past decade. It is of interest to note that the largest cattle increases are in the two-year-old and yearling classes, an indication that the cattle are being grown to a larger size before being marketed than formerly. This trend of development more than ever exemplifies the need for the improvement of pastures. It is probable that one reason for the overgrazed condition in some sections is related to the fact that cattle are being raised to a larger size.

Discussion and Summary

1. Agriculture in the Webb Municipality is fairly well organized. Better use of available pasturage might be secured by enlarging the Community Pasture and by reseeding farm pastures to cultivated grasses.
2. There is evidence of over utilization of farm pastures throughout the municipality. In certain cases this condition has developed to a point where the grassland is decreasing in production. Fortunately, this acreage represents a small portion of the total pasturage, being only about 20 per cent., but the pastures that are being depleted are part of farms, and their depletion will affect the efficient management of those units.

NOTE: Recommendations relating to estimated carrying capacity are based on expected gains of from 300 to 325 pounds on two-year-old steers per summer grazing period. Overstocking results in two effects: firstly, decreased gains on livestock, and secondly depletion of pastures. Although no records of gains are available for two-year-old steers in the Webb Rural Municipality, it is expected that they are less than the optimum. Overstocking will not produce more beef than moderate grazing, it merely puts about the same total poundage on more animals.

BLOCK STUDY OF THE RURAL MUNICIPALITIES OF COULEE NO. 136, SWIFT CURRENT NO. 137, WEBB NO. 138, EXCELSIOR NO. 166, SASKATCHEWAN LANDING NO. 167 AND RIVERSIDE NO. 168

Introduction

The studies undertaken during 1945 in the Chaplin and Webb Municipalities were continued throughout the summer of 1946. The work was conducted in the Rural Municipalities of Coulee No. 136, Swift Current No. 137, Excelsior No. 166, Saskatchewan Landing No. 167 and Riverside No. 168. This group of Rural Municipalities is adjacent to the Rural Municipality of Webb No. 138, and for purposes of reporting certain data relating to that Municipality are included in the following discussion.

Certain of the conditions encountered in the survey of the Chaplin and Webb Municipalities were noted during the course of the 1946 surveys. However, new conditions that indicate both good and poor land use were met with. Of particular interest is the general excellent farm practices on cultivated land to conserve moisture and to control weeds. On the other hand, the lack of equipment and knowledge regarding the control of wind and water erosion, the seeding of grass, the use of grass in planned land use programs, and the use of run-off water from spring floods is evident everywhere. It is apparent that farmers are organizing their resources to produce primary crops, principally annual cereals, but are making lesser efforts to develop resources of secondary interest. The quality of the cattle is not good, except on ranches and a few farms which are developed to provide sufficient supplies of feed. Too many farm cattle show the effects of insufficient summer pasture, and too many farm pastures show the effects of overgrazing. These conditions do not stabilize the farm economy.

Land Utilization

Land utilization records for six municipalities are summarized in Tables 16 and 17. In Table 16, the conditions of land use are stated in terms of acres, while in Table 17 the results are presented in terms of percentages. There are several points indicated by the data which warrant discussion.

Nearly 65 percent. of the lands in these municipalities are cultivated for the production of annual crops. In general, these lands are maintained in good tilth. Farmers are trying and, in most cases, succeeding in developing cultural methods suited to the soil and topographical conditions on their farms, and particularly for the purposes of conserving moisture and controlling weeds. There has been a small increase in cultivated acreage during recent years, particularly on the better soil types but this trend is not confined to the better land classes.

Some 138,000 acres of land being cultivated at present are considered to be submarginal for the production of wheat on farms three-quarters of a section in size or smaller. This condition exists in all municipalities from a low of 10,000 acres in Saskatchewan Landing to a high of 48,000 acres in Webb. It cannot be recommended that all of this land be retired from cultivation because, firstly, a large portion of this acreage is included as parts of larger farms, and secondly, crops other than wheat are being produced on them principally oats, barley and rye. However, large acreages are unsuitable for cultivation for annual crop production; a discussion of these is presented under the heading "Pasture Development". The large acreage of marginal and submarginal land that is being cultivated suggests that land abandonment may be an active factor during periods of economic stress and unfavourable moisture conditions in the future and indicates the need for immediate planning to meet such problems.

TABLE 16
Land Utilization Within Six Rural Municipalities in Southwestern Saskatchewan

Rural Municipality	Cultivated Land—Acres			Native Sod—Acres		Abandoned Farm Land—Acres			Total Acres
	Annual Crop	Perennial Crop		Pasture	Hay	Naturally Regrassed	Perennial Weed Stage	Annual Weed Stage	
		Hay	Pasture						
Couleee	138,310	870	1,385	59,955	2,145	1,210	1,575	640	207,360
Swift Current	190,160	815	6,830	70,910	1,570	1,195	870	445	276,480
Webb	171,485	190	4,425	86,250	1,495	2,705	3,260	1,010	276,480
Excelsior	180,770	210	2,920	105,390	4,415	730	4,725	1,525	302,635
Sask. Landing	126,665	600	380	67,725	1,300	1,010	1,390	660	201,425
Riverside	220,485	430	1,625	88,895	1,665	6,495	1,535		324,670
Total	1,027,875	3,115	17,565	479,125	12,590	13,345	13,355	4,280	1,589,050

TABLE 17
Land Utilization Within Six Rural Municipalities in Southwestern Saskatchewan

Rural Municipality	Cultivated Land in Percentage			Native Sod Percentage		Abandoned Farm Land Percentage			Total
	Annual Crop	Perennial Crop		Pas- ture	Hay	Natural ly Re- grassed	Perenni- al Weed Stage	Annual Weed Stage	Waste Per- centage
		Hay	Pasture						
Coulee	66.7	0.4	0.7	28.9	1.0	0.6	0.8	0.3	0.6
Swift Current	68.9	0.3	2.5	25.5	0.6	0.4	0.3	0.15	1.35
Webb	61.75	0.1	1.6	31.5	0.55	1.0	1.15	0.35	2.0
Excelsior	59.7	0.1	0.9	34.8	1.5	0.2	1.6	0.5	0.6
Sask. Landing	62.9	0.3	0.2	33.6	0.7	0.5	0.7	0.3	0.8
Riverside	67.8	0.1	0.5	27.4	0.5	2.0	0.5	...	1.0
Average	64.7	0.2	1.1	30.2	0.8	0.8	0.8	0.3	1.1
									100.00
									100.00
									100.00
									100.00
									100.00
									100.00
									100.00

Over 20,000 acres have been seeded to perennial grasses, approximately 1.3 per cent. of the area studied. The bulk of this acreage is used for pasturage, only a small portion is reserved for hay production. This is a point which needs some consideration, not only the small acreage seeded to perennial grasses, but also the uses which are being made of it. It suggests either that farmers are not prepared to seed perennial grasses for hay production, or else those species available for seeding are unsatisfactory from the farmers' viewpoint. Further it indicates that the present recommended varieties are more suitable for grazing than for hay purposes. As one farmer stated, he had to graze his cultivated grasses in order to secure a return from the land.

The possibility of rotational grazing and haying on cultivated pastures has been studied. In general this practice cannot be recommended, because the growth of the grass depends largely on available moisture. In years of low rainfall, growth will be too sparse to warrant keeping the land for hay purposes. However, during seasons of heavy rainfall, growth will be much greater. It seems advisable to reserve grass-seeded fields primarily for grazing, but to cut hay from the fields whenever growth is greater than the consumption capacity of the herds.

Nearly one-third of the total acreage is producing native grasses. Of this acreage, 97 per cent. is grazed and the balance reserved for hay production. The condition and carrying capacity of this resource is discussed in other sections of this report.

Three classifications relating to abandoned farm land are presented. A total of 31,000 acres has been abandoned. Of this amount, over 13,000 acres have reverted to a permanent cover of native grass species; an equal acreage is producing stands of perennial weeds; while only 4,280 acres are in the annual weed stage. That acreage under the heading "Naturally Regrassed" represents abandonment prior to about 1925 and consists largely of lands with sandy and sandy loam soil. The acreage listed in the column entitled "Annual Weed Stage" represents land abandoned within the last five or six years and could be seeded without prior cultivation. That area classed as "Perennial Weed Stage" indicates abandonment during the "Thirties"; this land needs seed bed preparation before seeding. It is worthwhile noting the reduction in the rate of abandonment during recent years. Actually much more abandonment occurred than is reported, particularly during the period from 1930 to 1938, but most has been brought back into cereal production. However, the acreage recorded indicates the area under permanent abandonment. It is expected that these figures will increase in the event of either the loss of markets or the occurrence of years of unfavourable growth conditions.

Vegetation

The plant cover within the area being discussed consists of both shortgrass and mixed grass prairie associations. There are large blocks of both associations, as well as small areas where the two intermingle.

TABLE 18
Vegetational Associations and Types, Their Percentages and
Associated Soils in Six Rural Municipalities in South-
western Saskatchewan

Assoc- iations	Vegetation			Associated Soils
	Vegetation Types			
	No.	Dominant Species*	% of Area	
Short- grass	1	Blue grama grass, common speargrass	19.5	Fine sandy loam and light loams
Mixed grass	2	Bluejoint, green needlegrass	7.7	Heavy clay
	3	Short-awned porcupine grass, bluejoint, junegrass	11.5	Clay loams and loam (Cypress)
	4	Common speargrass, blue grama grass, junegrass	37.1	Loam and silty clay loam
	5	Dropseed grass, com- mon speargrass	6.6	Sand
	6	Bluejoint, alkali grass	2.8	Alluvium
	7	Alkali grass, Nuttall's alkali grass, blue- joint	3.9	Alkali
	8	Mat muhly, blue grama grass, common spear- grass	8.9	Eroded
		Waste	2.0	
Total			100.0	

*—Common and scientific names of plants referred to in this report are presented in Appendix 3.

On the basis of the dominant grass species, eight vegetational classes have been recognized. These, together with their dominant species, the proportion of each in relation to the entire area, and

the associated soil types are presented in Table 18. The statements presented in the Table refer to both cultivated and uncultivated land, and thus are percentages of the entire area and not of the grassland only. It is presumed that intervening cultivated land produced the same plant cover originally as do the existing grasslands at their margins, providing their soil and topographic features are similar.

The types where the vegetation indicates that grazing is the best land use include those numbered 1,5,7, and 8. This is a total of 38.9 percent., or approximately 616,000 acres, considerably more than is classified as grassland at present. (Refer to Table 16). In addition, the best land use practices for portions of other types is for grazing also, where the land is too stony or too steeply rolling to warrant cultivation for cereal production. Twenty per cent. of the area included in Type No. 4, 25 per cent. of Type No. 3 and 50 per cent. of Type No. 6 are so considered. These portions increase the area where grazing is recommended as the principal land use practice to 50.7 per cent. of the region.

The utilization of the grazing land varies greatly. A general statement covering the use of pasture can be summarized as follows: the ranchers utilize their pastures according to productivity, while farmers overgraze in 95 out of 100 instances.

The utilization of each pasture was measured and rated according to a scale from 0 to 5. Those pastures classified as "0" showed no indication of use, while those classed as "5" were eaten out to a point where annual and perennial weeds dominated the cover. Class "3" pastures were those utilized at correct rates. Other intermediate classifications indicated utilization between the extremes of no use and grazed out. On the basis of this classification, an average utilization value was determined for each municipality. These data are presented in Table 19.

TABLE 19
Percentage of Grass Acreage in Each Use Class and Average Utilization For Each Municipality Within Six Rural Municipalities in Southwestern Saskatchewan

Municipality	Degree of Utilization of Pasture Land					Average use for each R.M. in percentage
	0 & 1	2	3	4	5	
	%	%	%	%	%	
Coulee No. 136	1.7	9.5	46.2	38.2	4.4	67
S. Current No. 137	1.8	15.6	48.6	30.2	3.8	63
Webb No. 138...	1.5	20.8	62.6	14.0	2.1	60
Excelsior No. 166 ..	0.25	1.8	52.7	45.0	0.25	69
Sask. Landing						
No. 167...	8.2	45.1	29.1	16.6	1.0	51
Riverside No. 168	0.2	10.5	58.9	26.0	4.4	65
Average	2.3	17.2	49.6	28.3	2.6	

The utilization studies of the grassland within the six Rural Municipalities indicate that approximately one-half the pasturage is grazed at average rates, that 30 per cent. is overgrazed and that 20 percent. is underutilized. Reasons for underuse include insufficient fencing and stock-watering development, small sizes of fields, too few livestock on individual farms, parcels of land several miles from farm headquarters, reserves for winter grazing, and sparse settlement. On the other hand, overgrazing is associated with dense farm populations, lack of knowledge about the carrying capacity of the resource, insufficient stock-watering facilities and too many cattle on small pastures.

The last column in the table shows the average use of pastures in each municipality. Good utilization is established at 55 percent. If over 60 per cent. of the forage is removed, overgrazing develops; when less than 50 percent. is utilized, a somewhat larger livestock population could be carried. On this basis, the Rural Municipality of Saskatchewan Landing is the only district where overgrazing is not practised. Large acreages in this municipality are reserved for fall and winter grazing for livestock returning from summer grazing on the Matador range; the fact that this pasturage is underutilized influences the average use of the municipality. In the densely settled farming districts in Saskatchewan Landing Municipality, the pastures are as badly eaten out as they are in other districts. The Rural Municipalities of Webb and Swift Current are slightly overgrazed. The beneficial effects of the Community Pastures are reflected in the conditions of their grass covers. Three Municipalities, Coulee, Excelsior and Riverside, are overgrazed and require additional pasturage if they are to maintain their livestock inventories.

Different utilization rates for each municipality are associated also by the proportions of good quality and poor quality soil within that municipality. Data presented in Table 20 show the degree of utilization on a few of the important soil types within the area.

TABLE 20
Degree of Pasture Utilization on Different Soil Types in
Southwestern Saskatchewan

Soil Type	Degree of Utilization of Pasture Land					Average use for each soil
	0 & 1	2	3	4	5	
	%	%	%	%	%	%
Light Loam	12.6	21.2	38.4	21.2	1.6	53
Heavy Clay (Sceptre)	0.4	1.5	31.0	66.2	1.0	73
Loam (Cypress)	2.7	2.1	16.3	51.3	27.6	80
Loam and S.C.L.	0.5	6.3	27.1	65.6	0.5	72
Sand	1.6	10.3	70.4	17.5	0.2	61
Eroded		30.0	55.7	13.8	0.5	57

It will be noted that moderate use is being made of the grass resource on the light loam, the sand and the eroded soil types. On the other hand, extremely heavy use has been made of the vegetation on the Sceptre heavy clay, the Cypress loam and the loam and silty clay loam types. The latter three are those most densely settled and operated by farmers. Where utilization is as great as 80 percent, the cover has changed from one of grasses to one of forage weeds. The conditions of the pastures are reflected in the cattle, which are small and under-nourished. These data indicate the need for better farm pastures, and also that the development should be encouraged on the better quality soils as well as on those of lower productivity.

A few farmers are developing pastures to provide grazing for dairy cattle and flocks of sheep. Brome grass and crested wheatgrass are the two principal crops being used. Two records taken from farmers, who are equipped to handle livestock in conjunction with dryland farming operations, indicate that production from cultivated pastures is sufficient to compete successfully with that from cereal crops on good quality land. One man, who markets his production as cream, states his gross acre income is somewhat less than if he were raising wheat, but could be increased if he could market whole milk. A second farmer, who keeps a small flock of sheep, shows that his gross acre income is \$2.00 greater from sheep than from wheat. In both cases the returns for labour per hour of work are less than when cereals are produced.

The grazing capacity of the area studied is relatively constant between municipalities. Variations depend on the proportions of high and low producing grassland within each, the degree of utilization practised and the extent of pasture development. The carrying capacities of the six municipalities as units for the principal soil types are presented in Tables 21 and 22.

The effects of large areas of sandy soils which produce relatively low yields are indicated in the average grazing capacity for Webb, Swift Current and Riverside Municipalities. Although there has been considerable pasture development, principally reseeding in these three districts, the beneficial effects are masked by the larger portion of low producing areas. Overgrazing has reduced the carrying capacities of Coulee and Excelsior Municipalities.

TABLE 21
Grazing Capacity in Terms of Acres per Cow-Month (C M) and
Animal Units (A.U.) per Six-Month Grazing Season in
Six Rural Municipalities in Southwestern Saskat-
chewan

Rural Municipality	Acres Required Per C/M	No. of A.U. per six-month grazing Season
	Acres	A.U.
Coulee No. 136	3.7	2,900
Swift Current No. 137	3.6	3,500
Webb No. 138	4.1	4,520
Excelsior No. 166	3.3	5,885
Sask. Landing No. 167	3.3	3,740
Riverside No. 168	3.6	4,450
Average or Total . . .	3.5	24,995

TABLE 22
Yield Per Acre in Pounds of Forage and Average Grazing
Capacity in Acres Per Cow-Month (C/M) on Six Soil Types
in Southwestern Saskatchewan

Soil Type	Av. Yield of Forage in Lbs. Per Acre *	Range in Yields of Forage in Lbs. Per Acre *	Grazing Capacity in Acres Per C M
Light Loam	330	260-350	3.7
Heavy Clay (Sceptre)	530	290-610	2.4
Loam (Cypress)	360	170-450	3.3
Loam and Silty Clay Loam	350	250-425	3.4
Sand	240	215-290	5.1
Eroded	170	130-260	7.2

*—The average yield represents the return under all conditions of utilization; the range of yields indicates the effects of overgrazing in terms of yield per acre. These yields are calculated from measurements made of the grass cover.

Despite relatively large acreages of eroded land along the Saskatchewan River and Swift Current Creek, those municipalities which contain the eroded land have relatively high carrying capacities, principally the Rural Municipalities of Saskatchewan Landing and Excelsior. The larger acreages of high producing grassland contained

in these districts balances the effects of the low yield from the poorer grass types. Even the effects of a general overgrazed condition do not reduce the carrying capacity of the Excelsior Municipality to the low level that might be expected; again the acreage of high producing grassland tends to mask this trend.

Referring to Table 22, it is of interest to observe that the greatest ranges in productivity are associated with the most productive soil types. Although one factor that causes this wide difference in yield is the variation on different parcels, the factor causing the greatest effect is that of overgrazing. Yields of normally utilized pastures are near the maximum that can be obtained, but overgrazing reduces this to as little as 35 per cent. of the maximum production.

Pasture Development

One P.F.R.A. Community Pasture has been established within the six municipality block, that of Webb-Swift Current. It provides grazing for over 1,000 head of livestock during the summer months. It is being maintained in a productive condition, and the livestock carried make good gains. The breeding facilities could be improved by building smaller breeding fields. Also the grazing facilities could be increased by more intensive spring and fall use of the large acreage seeded to crested wheatgrass. To obtain these facilities, better planning of fencing and greater amounts are needed.

Public grazing privileges are available to residents of these municipalities in the Matador Community Pasture. This pasture requires additional development of stock-watering facilities before it can be grazed to its capacity.

More grass is needed to maintain the existing livestock population. As there is no unused grassland resource to supply the need, it can be obtained only by planned development. Such cannot be accomplished by any one method because of the variety of conditions encountered.

Grazing and overgrazing native grass pastures within any of the more productive soil type area is as great an example of poor land use as is the cultivation of land with sandy soil for wheat production. These soils are capable of producing from three to ten times what they are doing at present (the range of increased production is caused by the condition of the pastures at present; overgrazed lands could produce up to 10 times what they are doing). Cultivation of such lands, wherever topographical conditions warrant, is the first method to employ to increase the grassland resource. Local conditions will determine whether brome or crested wheatgrass will be the principal component of the crop seeded.

Suggestions have been made whereby ranches will be purchased and incorporated into community pastures. Although such development will provide grazing facilities for a number of farmers, it does not increase the total grazing capacity of the district. The conception amongst farmers regarding the carrying capacity of these lands is erroneous; they consider the grazing capacity to be at least

twice what it actually is. Consequently, little or no increase in carrying capacity can be obtained by incorporating such areas into community enterprises.

However, community pastures are needed. Extension of Webb-Swift Current is desirable, and creation of others is necessary to stabilize the economy of the farm population, to increase the grazing capacity and to utilize the resource according to the best land use standards. There are districts in each municipality where such development can be undertaken. Districts where the soil and topography indicate that grazing is the preferred system of land use, and where such records are substantiated by economic and land use surveys. Areas suggested for such development are listed in Table 23.

TABLE 23
Suggested Areas For Community Pasture Development in Six Rural Municipalities in Southwestern Saskatchewan

Rural Municipality	Areas Recommended for Community Pasture Development	Total Acreage	Cultivated Acreage
Coulee No. 136	(1) Secs. 25-27, 34-36, T.13, R.11 Secs. 1-3, 10-12, T.14, R.11	7,680	3,200
	(2) Secs. 19-23, 26-32, T.14, R.11	7,680	3,000
	(3) Secs. 13, 14, 22-27, 34-36, T.15, R. 10	7,040	3,500
Swift Current No. 137	(1) Extension of existing pasture		
	(2) Land adjacent to and between Swift Current and Lac Pelletier Creeks in T.13, R.15	16,000	4,000
	(3) Central portion of T.16, Rges. 14 and 15	16,000	7,000
Webb No. 138 Excelsior No. 166	(1) Extension of existing pasture (1) Secs. 1-3, 10, 11, 14, 15, 20- 22, 27-30, T.16, R.11	12,800	5,000
	(2) Secs. 16-21, 27-34, T.17, R.11	8,000	5,000
Sask. Landing No. 167	(1) Secs. 6-7, 17-21, T. 17, R. 13		
	(2) Secs. 1-32, T. 17, R. 14		
	(3) Secs. 21-28, 33-35, T.17, R.15		
	(4) Secs. 3, 4, 9-11, 13-15, T.18, R. 15	39,000	16,000
Riverside No. 168	(1) Secs. 1-28, 31-34, T.16, R.16	20,000	7,000
Total		134,200	53,700

It does not necessarily follow that community pasture development should include all land within the suggested areas. However, these are the areas where possible development should be investigated. If developed according to the above outline, pasturage would be provided for nearly 10,000 head of cattle more than the grazing capacity records indicate can be grazed at present. Certain acreages would be lost to cultivation but these lands are those where the production of cereals is variable and where crop failures occur most often. Only the larger areas are noted in Table 23. There are many smaller ones which are equally unproductive, and where grazing is the best land use practice to be followed.

Winter Feed Supplies

Although the grazing capacity of the six municipalities is approximately 25,000 head for a six-month grazing season, the livestock population amounts to over 40,000* head. This additional population is carried on the Matador range during summer, on pastures seeded to annual crops and by overgrazing the native grasslands.

There are about 15,500 acres of cultivated and native hay land, which will produce approximately 12,000 tons of feed each year. As farmers and ranchers provide about one and one-eighth tons of feed per animal per winter, the total requirements will amount to between 45,000 and 50,000 tons. Thus an additional 35,000 tons of feed will be needed to maintain the livestock population; this amount is provided by annual crops grown on cultivated land.

Data collected to determine the utilization of cereal straw for winter feed supplies, indicate that little or no planned use is being made of this resource. There are few straw stacks and none of baled straw.

The problems of winter feed supplies do not become acute during the average or better than average growth years. Feed supplies are required when growth is below normal. Thus reserves are needed, not only in the area studied but throughout the province to meet the needs of the improvident.

During years when roughages are in short supply, concentrates can be used to supplement rations. A maintenance ration for a mature cow consists of from 16 to 20 pounds of hay daily, or lesser amounts of hay supplemented with other feeds. In considering the use of grain and oilcake supplements, it must be remembered that the biological processes of a cow are such that at least 10 pounds of roughage are needed daily. The balance of the ration may be provided by other forms of roughage or by concentrates. One pound

*—The livestock population of the area has been estimated as approximately 40,000 head. This result was obtained by interpolating the census record of 1936 in terms of the results obtained by the Economics Division in their surveys of the R.M.'s of Chaplin and Webb in 1945.

of oilcake will replace five pounds of hay or from two to three pounds of grain in a maintenance ration. One pound of grain will replace two pounds of hay for a calf, or three pounds of hay for a mature cow. Wheat, oats or barley, or mixtures of these with rye can be used as supplements, and the cost of using one or the other will depend on the cost of producing one pound of each crop. Yields of grain grown on sandy loam soil at the Dominion Experimental Substation, Valjean, Saskatchewan, show that barley produced 1,296, oats 877 and wheat 726 pounds of grain per acre. In this case the greatest economy for a maintenance ration would be obtained by using barley to reduce the roughage in a ration.

The feed supplies that the farmer has available are those which form the base of the fodder reserve. There is no doubt that these are not being exploited to the greatest degree, and that there is sufficient feed lost, destroyed and misused to feed many head of stock. The several sources to obtain feed reserves are considered.

The base of all livestock feed is grass. This source provides the bulk of the spring, summer and fall grazing. However, it must not be overlooked as a supply for winter needs. Small blocks of abandoned farm land are suitable sites for winter pasture development. Experimental results show that cattle will maintain a thrifty condition when grazed on either native grass or crested wheatgrass winter pasture. If crested wheatgrass is used, the field should be seeded in 6-inch rows at the rate of 15 pounds per acre. A stand from this rate of seeding grows thick and short, and makes desirable winter pasturage. The possibility of using grass for winter feed should be exploited to its greatest degree, and be considered as the base and not a supplement to the winter feed supply.

Annual Crops:

Seventy-five percent. of the winter roughage in the area is obtained from annual crops, principally oats and fall rye. This type of supply can be expected to yield approximately two tons per acre if grown on summerfallow and seeded preferably before the 1st of May; June seeding seldom yields more than one ton per acre, except in exceptionally good growth years. Experimental records indicate that the seeding of one acre per animal unit to Banner oats, Prospect barley or fall rye, will provide sufficient winter feed to maintain the farm livestock population and set up reserves to prepare for years of poor growth conditions.

The figure of one acre per animal unit is not a good measure of supply, because inherent soil characteristics will decrease or add to that amount. Furthermore, a single feed does not meet the nutritional requirements of livestock. Thus, although annual crops may form the backbone of a reserve winter feed supply, they will need to be supplemented.

Perennial Crops:

Perennial crops provide nearly 25 per cent. of the winter feed supply, about one-quarter of which is grown on cultivated land, the balance on native hay meadows. This type of supply can be ex-

pected to yield about three-quarters of a ton per acre over a period of years with a range of from nothing to over two tons when suitable mixtures are grown and growth conditions are favourable. Depending on the district, either crested wheatgrass or brome mixed with alfalfa produces the highest yields and the best quality feeds.

More acreage devoted to producing this type of feed is required, especially on lands which either are spring flooded or can be irrigated. The addition of water increases the yield from two to four times that obtained from dryland production, and stabilizes production so that wide variations in the yield do not occur.

However, production on dryland should not be overlooked, not only for hay purposes but for cured fodder that can be grazed during the fall and winter months. The Rural Municipality of Saskatchewan Landing has a quarter-section seeded to crested wheatgrass; this is reserved for hay production and produces from 50 to 150 tons of hay and cured grass each year. If one quarter-section in each township was so developed, it would constitute a reserve of feed that would assist the neighbourhood generally.

Little attention has been given to the development of hay flats. The yield from this supply varies considerably from year to year, while the quality of the hay is often poor. There are some 12,500 acres of such land in the six Rural Municipalities, producing less than one ton of feed per acre each year. This is a source of supply where the yield can be increased and stabilized, providing development is undertaken to control and conserve water and to seed with more productive and more nutritive plant species.

Straw:

There is little planned use of straw in the feeding program of the area. In an area, where nearly one-half million acres of land are combined each year and the straw scattered over the land, it is necessary for the Swift Current Horse Co-operative Marketing Association Limited to go out of the district to secure supplies of straw to feed animals waiting slaughter. If only 10 per cent. of this feed were saved, in conjunction with other feed resources, the problem of reserve fodder supplies would be non-existent.

It is true that straw alone is insufficient to provide all the elements required for life processes of livestock. Straw requires supplements, principally supplements that provide protein and phosphorus. Experiments have shown that all ages of beef cattle can be maintained in a thrifty condition on a ration of straw together with from one-half to two pounds of oilcake per day, depending on the age and condition of the cattle. Straw needs to be supplied to the limit of the animals' capacity to consume. Wheat, oats or barley straw are suitable feeds when fed in conjunction with oilcake.

Straw from combines presents problems of gathering and preserving. Several methods of harvesting appear possible, the most efficient being to bale the straw with an automatic pick-up baler. The cost of such operations varies with the heaviness of the crop and the distance between the field and the site where it is to be stored. Experimental evidence shows that the cost of baled straw,

including baling, transporting and stacking varies from \$2.00 to \$5.00 per ton. At the lower range this is very cheap feed, while at the higher charges the nutrients contained in the feed are sufficient to warrant this charge when beef prices are average or above average figures.

Other methods of handling straw from the combine deserve mention. Few farms are equipped with balers, but many farms have rakes, sweeps and stackers. There is no experimental evidence to indicate the cost of such methods of conserving feed, but estimates suggest that these charges will be no greater than the cost of baling.

Thus it appears that there are sufficient supplies of feed produced within the area, or land available where the feed can be produced, to meet the needs of a yearly as well as a reserve feed program. The acquisition of automatic pick-up balers by municipalities, by community organizations or a group of farmers would assist materially in conserving straw for feed. Likewise the use of equipment owned by the farmers at present could be put to work to conserve supplies of straw. Intensification of the water development program in conjunction with forage crop plantings will assist materially to achieve the desired objective; likewise the choice of the most productive annual crops will increase the fodder supply without increasing the acreage required to produce that feed.

Although reserves of feed are needed for the winter period, the fact must not be overlooked that reserves are needed for all periods of the year. Livestock are not economic farm producers if they are undersized, unthrifty and unsaleable. To produce animals that pay dividends, an abundance of feed is required in the summer. Unless this is provided, best gains and maximum production of animal products will not be achieved. Thus the problem of reserve feed involves sufficient feed to maintain animal and production functions during every summer.

Water Development

One of the agricultural resources not fully utilized in the six municipalities is the spring run-off. Development to date is sufficient to control less than 10 per cent. of the water that flows off the land each spring, and most of this is stored for domestic and stock-watering purposes. It is realized that the total run-off cannot be conserved, but a considerable portion could be put to work to increase production.

There is plenty of land to put this water on, more than there is water to serve it efficiently.

No one type of water development will utilize the resource. Variations in the topography and soil will determine the type of development most feasible. Amongst the possibilities the following types of development occur most frequently:

1. Coulee flats, numerous in the Rural Municipality of Coulee.
 2. Sloughs, free from alkali and which have possibilities of drainage.
- Land areas where the soil is classified as Haverhill loam and clay

loam lend themselves to slough development for crop production. The soil in the sloughs is free from alkali, deep, free of stones and productive if the water can be controlled. A few farmers are using this resource; a negligible fraction of those who could do so.

3. Dams and dugouts have been built at many sites, but only a small portion of the possibilities have been explored.
4. Soil areas classed as alluvium are often associated with supplies of water, but inadequate ponding and drainage systems are usual also. A large area in Saskatchewan Landing and Swift Current Municipalities needs exploration to determine what work is needed to develop the area.
5. Use of spring run-off on upland by the use of spreader systems. Such development appears feasible on level soils classified as Sceptre heavy clay and Cypress loam.

The suggested types of development are the results of observations and discussions with farmers. No levels or detailed studies of the water resource were attempted. However, the many possibilities of using water are not appreciated, nor are the associated problems understood by the farmers. To add to the general appreciation and to add to the existing knowledge, it is recommended that intensive water use studies be undertaken in selected districts. The following areas are considered suitable for such research programs:

- (1) Secs. 28-33, Township 15, Range 11, W. 3rd Meridian.
- (2) Secs. 5-8, Township 14, Range 12, W.3rd Meridian.
Secs. 29-32, Township 13, Range 12, W.3rd Meridian.
- (3) All township 18, Range 12, W.3rd Meridian.

Control of water is desired not only to increase and stabilize farm production, but to prevent soil erosion by water also. The destruction of soil by water erosion in the six Rural Municipalities covered is proceeding at an ever increasing rate. Gullies are common and sheet erosion is noticeable on many soil types. Light soils and those of a moderately rolling nature are most affected, but even level land shows indications of the condition.

Those farmers who are harnessing the spring run-off to add to their moisture supplies are growing annual crops. Many farmers with whom the matter of cropping was discussed stated their interest in perennial crops for sites where additional supplies of water could be used. However, their general reaction appears to be a lack of knowledge regarding the crops most suitable, the selection of sites for forage production and the use of water on such crops. There appears to be a need for continued and, if anything, increased service to educate the farmer to utilize the water resource to a greater degree.

The data presented in Table 16 show that farmers are not prepared to seed dryland sites for the production of perennial hay crops. Data in the same table show that they are using meadow land to obtain a portion of their winter feed supplies. These data suggest

that more effort is needed to develop the meadows for hay production, and to obtain crops that are adapted to utilize the water that can be put on them.

Summary

The important points presented in the previous discussion are emphasized in this summary.

1. Farmers are managing their cultivated lands more efficiently than their native pastures.
2. Overuse of pasturage is more evident on the better soil types than on those of poorer quality. The heaviest use of native pastures is associated with dense farm population.
3. Cultivated grasses are being seeded, but only 15 percent. of the seeded acreage is reserved for hay production.
4. Nearly 75 percent. of the winter hay supplies are obtained from annual crops.
5. The average carrying capacity of the native grasslands averages 3.5 acres per cow-month. Overgrazing has reduced the grazing capacity of the land, and particularly so on the more productive soil types.
6. The rate of land abandonment has slackened during the last five years, but even high prices and good yields have not halted the trend.
7. There are areas where grazing is recommended as the best land use practice. A list of such areas is presented.
8. The spring run-off is the least utilized agricultural resource in the area.
9. Water erosion is more serious than a casual survey would indicate. Gullies are common and the effects of sheet erosion are apparent.

IX — Livestock Production Problems

The livestock policies for the area depend upon the feed resources available. The major classes of livestock produced are dairy and beef cattle, swine, sheep and horses. However poultry, both turkeys and chickens, produce an important part of the farm income.

Cattle production has varied during the past three decades. Drought years prior to and during 1937 caused forced marketings at ruinous prices, and were responsible for reducing the population of breeding stock. Although this period of depression and drought was the greatest disaster which has affected the livestock industry in the country, other shorter periods of drought and low prices have added to the burdens of the livestock operators. These several periods have created unstable conditions, which have upset and sometimes nullified the benefits of well-balanced cattle policies and pro-

BREEDING COWS IN THE CARRYING CAPACITY EXPERIMENT

Grazed at 40 ac. PER HEAD Grazed at 20 ac. PER HEAD

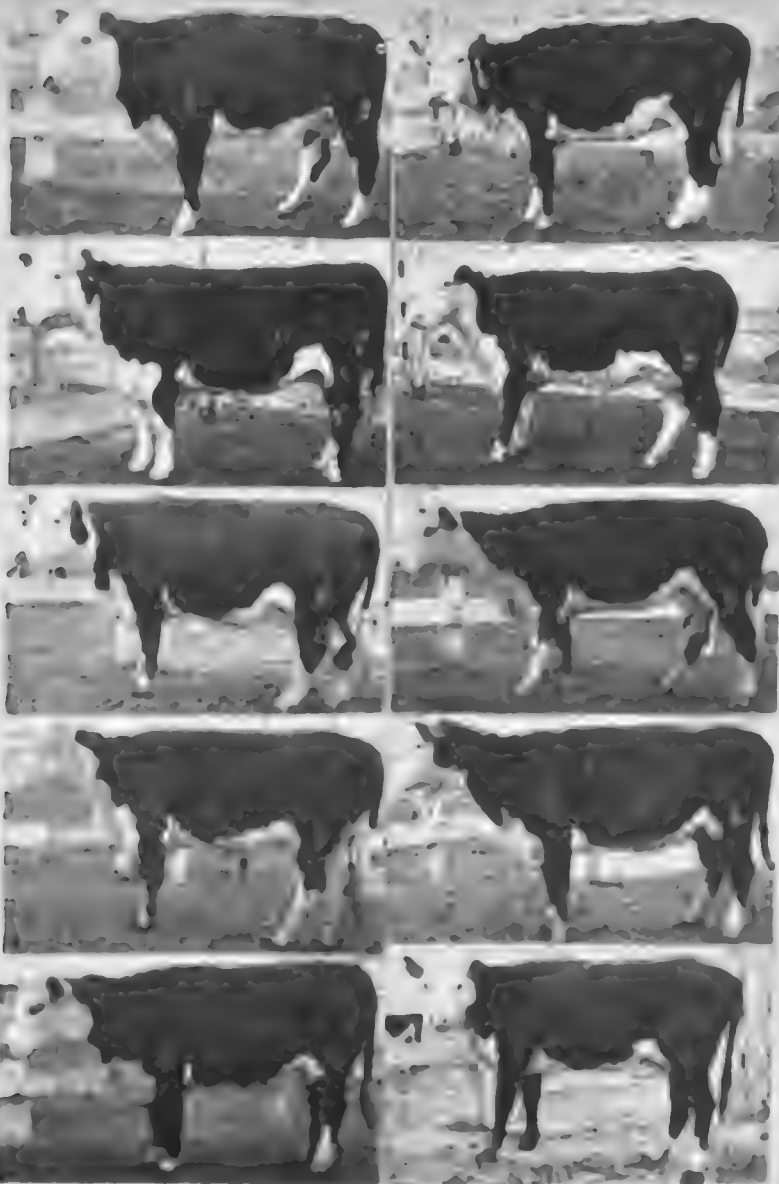


Plate I. Breeding Cows in the Carrying Capacity Experiment, Dominion Range Experiment Station, Manyberries, Alberta.

grams. In addition, these periods of stress have affected adversely the proper use of both non-arable and arable land. Twenty-five years ago good quality cattle, which had heavier market weights than now, were being sold from farms. The Committee believes that lower market weights are not caused by poor breeding practices but by the improper use of farm pastures and the lack of sufficient feed reserves for the maintenance of cattle throughout the entire year.

Plate 1 illustrates the condition and type of cattle that are developed where both sufficient and insufficient summer pasture is provided. It will be noted that the cattle grazed at 20 acres per head are thin, lack growth and development, have poor tail-heads, are high in the back and flank and present a general unthrifty appearance. On the other hand, those cows grazed at 40 acres per head have all the requisites of good breeding stock. All of these cattle are the same age and all were selected from the same calf herd. It is of interest to record the winter maintenance costs of these two groups. The cows grazed at the rate of 20 acres per head required winter feed that cost over three times that of the 40-acre field cattle. The greater feed charge was due to the longer feeding period, greater consumption of feed and a greater percentage of the group on feed. During certain winters all cows grazed at 40 acres per head during the summer, grazed throughout the winter, whereas a large portion of the 20-acre cattle required supplementary feeding every winter.

As a result of overgrazing, there is a cumulative effect on the weaning weight of the calves. Calves from the lot grazed at 20 acres per head were 55 pounds lighter in weight at weaning time. The effect is carried through until the animals are two years old, at which time the weight of a two-year-old steer will be nearly 200 pounds less than one which has had sufficient food. In addition to loss in gain, when the heifers are carried through the winter, the extra feed required greatly increases the cost of production, also the risk of loss is much greater during severe weather conditions.

The production of swine, like cattle, has varied. During 1943-1944 there was a definite increase in production to meet war demands. This sharp increase, along with lack of experience, resulted in many management and disease problems and, in some instances, heavy losses occurred. This partially caused a sharp reduction of swine numbers in 1945. However, there is no doubt that swine production has an important place on the farm. The trend at the present time is for a more uniform production program with improvement in breeding and quality. This should be encouraged in every way, because swine production can make up an important part of the farm income. In addition, hogs will use those grains from the farm that are not always desirable for market purposes, such as low grade wheat and light crops of barley and oats. Swine production in this area should be carefully studied by farmers. It should be looked upon in farm management as an important part of the livestock program, but only insofar as grain supplies are available. Sufficient reserves of grain for one year's supply to the swine herd of the farms should be kept on hand at all times.

In the proper use of land, the livestock policy will be mostly dependent upon the production of cattle and sheep. Within the 16 municipalities there are well over 103,000 acres of non-arable, vacant and abandoned farm land to be regrassed. They will produce palatable and nutritious grass adaptable for cattle and sheep production. In land use planning the use of this land in relation to crop land and the farm unit is the major problem to solve in obtaining a well-balanced livestock economy.

1. Cattle—The problem varies with each municipality. There are, however, three main lines of approach to a cattle policy.

- (1) Where the cattle income will be 50 per cent. or more of the total farm income.
- (2) Where the cattle income will be secondary to the grain income.
- (3) Where dairy cattle and milk production occupy the major part of the livestock income.

The approach in 1 and 2 is dependent upon the amount of pasture land available. This phase is discussed elsewhere in the report. The cattle policy for land use, however, must embody two cardinal principles, firstly low rate of taxation and rentals, and secondly security of tenure. Basic to any plan is the necessity of obtaining the maximum gain in weight of marketable animals from a unit area of land. This involves controlled grazing with the proper distribution of cattle. If any factor is introduced to upset this principle, then it will increase the cost of production. In other words, "grass is the soul of production". Coupled with grass supply is winter feed. At least one ton of feed per head is required to maintain an animal for the winter period. During mild winters, when some grazing can be done, it will be possible to save sufficient feed and create a feed reserve to meet emergent conditions.

The class of animal marketed will depend again on the feed supply, and in this connection some further study will need to be given to the following points:

- (1) The age of the feeder steer to be marketed.
- (2) The possibility of the supplemental feeding of steers on pasture in order to increase their marketable weight and quality. There is sufficient data to guide a sound Land Use program in this regard.
- (3) Finishing steers in the feed lot on the farm, particularly on the irrigation project.

The above points are secondary to the basic plan of giving maintenance for the production of thrifty cattle. Grass and fodder are the key to a successful cattle production policy and, therefore, should be studied first. This should be followed up with an organized Land Use program that will guarantee the above policy.

The production of dairy cattle will be somewhat limited. In most of the municipalities the dryland conditions do not justify

any large scale dairy program. Milk cows will be maintained for the domestic milk supply and some marketings of milk and cream on a small scale. There is no doubt that the production of dairy cattle will be closely linked with that of beef cattle. Therefore, a constructive breeding program is urgently needed and should be undertaken as soon as possible.

The Municipality of Excelsior has had a Community Pasture project for many years in which they graze around 700 head of cattle on 2,000 acres of low lying land. In order to improve the marketable quality of the cattle, it is believed that this project can be greatly improved by supplemental feeding of the dry cattle on pasture. A division fence could be erected, the dry cattle being kept in one pasture and the wet cows in the other. Around July 15th, self feeders of grain and oilcake could be placed in the pasture in which the dry cattle are kept. Experiments and pasture studies have shown the value of such a plan and would give profitable returns to the farmer. The project could be organized on a co-operative basis. Its adoption is worthy of consideration and would result in better land use.

2. Sheep Production:

Sheep have not been popular farm animals. Within the area there are several large flocks, but these are on ranches which are organized to produce mutton and wool cheaply and efficiently. The few farmers that have flocks report that sheep are easy to manage and that the returns from their flocks add materially to the total farm income. Studies undertaken indicate that the acre returns from sheep production are in many cases greater than the return from wheat. However, before any large increase in farm flocks can be expected, it will be necessary for farmers to learn more about both sheep and pasture management.

There is no evidence to support the belief that sheep will graze out pastures quickly. Such can be caused by any class of livestock if poor pasture management practices are followed. Many pastures can be improved by grazing sheep, as they will feed on plants that are unpalatable to cattle. However, if pastures are overstocked for a period of years, an overgrazed condition can be expected.

In order to develop the sheep industry, it appears that more knowledge of management is required. It is suggested that a co-operative project, supervised by competent and experienced sheepmen, might lead the way to a better understanding of sheep production.

3. Livestock Policy Re Swift Current Irrigation Project:

Once the irrigation project is fully developed, it will give an insurance of fodder to the livestock population in most of the 16 municipalities. It will be a feed centre. The livestock policy here will involve the following in the Land Use program:

- (1) A place for winter maintenance of beef cattle and sheep where the by-products of the irrigation unit, such as straw, stubble, low grade hay and grain, can be used and grazing can be done on ditch banks, etc.

- (2) A centre for finishing cattle and lambs, either on an individual or co-operative basis, where sufficient roughage is available to utilize the grain grown in the area.
- (3) Specialized dairy production.
- (4) A permanent policy in swine production.

During the next five years, a program to inaugurate a sound livestock policy is essential to the welfare of the people and to the success of the irrigation project. Whenever there is a surplus of feed there will be available always and at close proximity large numbers of feeder cattle and feeder lambs. The project should create a permanent finishing area of quality cattle and lambs. It has great possibilities and will give insurance to permanent Land Use planning in the 16 Rural Municipalities.

4. Livestock Policy and Land Use Planning:

Livestock production in the area studied must be considered on the basis of the resources available, how these resources may be used to build an economic farm unit, and how production of livestock may be maintained over a period of years without any serious economic upsets. The first step towards this objective is a progressive educational program through the Agricultural Conservation and Improvement Committees of the Municipalities. There must be a different trend of thinking developed in cattle production. It is not a question of growing cattle on the old orthodox plan, i.e., just having cattle, but of considering the seasonal value of the grazing, together with pasture and feed resources, and how these factors fit into the general farm program.

The Livestock Policy should be built on the following factors:

- (1) Grazing capacity of non-arable land.
- (2) Possibilities of winter feed production for maintenance.
- (3) Seasonal differences in nutritive values of grass and feed peculiar to the area.
- (4) Methods for improving quality of marketable animals, based on the nature of feed resources.
- (5) Feed and grass reserves to give insurance against drought and abnormal winters.

X — General

THE SWIFT CURRENT CREEK IRRIGATION PROJECT

The land included in the Swift Current Creek Irrigation Project extends eastward from Swift Current to Morse and Hodgeville. Some 25,000 acres of land can be irrigated from storage at Duncairn and Highfield reservoirs, which have a total capacity of 92,000 acre feet. Present plans for development indicate that about one-half of the irrigable area will be supplied with water from a gravity system, while the balance will have to be pumped.

Soil surveys show that about 8,000 acres of irrigable land have a soil suitable for practically all crops, including vegetables, cereals and forages. An equal amount has a soil on which cereals and forages can be grown satisfactorily. The balance is best suited for production of forages, although cereals will undoubtedly do very well on the land, providing good cultural practices are followed.

Most of the major structures have been completed, but no systems of laterals for water distribution have been attempted. Until these are finished, no irrigation can be practised except on lands adjacent to the main canal. The lateral systems will be expensive because large structures are needed to carry water to relatively small acreages. Completed major structures include Duncairn and Highfield reservoirs, the supply canal connecting them, and the Rush Lake drainage canal. Uncompleted major structures include the two small storage and water control dams north and west of Rush Lake, the pumping stations at Herbert and Highfield, the supply canals to Rush Lake, Herbert and Neidpath, moving the C.N.R. tracks at Highfield, lining sections of the supply canal and others. Uncompleted secondary structures include all lateral and drainage systems. Under the present policy of development, none of the lateral systems will be built by the P.F.R.A.

The project is primarily a feed reserve base. This point has not been considered clearly enough, and especially so when the original policies for development and settlement were changed. Returns per acre from the land will be small for some time, because there will be a limited variety of crops that can be grown until the fertility of the soil is built up above its present low level.

Settlement, development and management policies are holding back the completion of the project. Taking into consideration the quality of the soil, the program of cropping required to stabilize dryland production within the surrounding area, and the expensive development needed to complete the project in relation to the relatively small acreage that can be served, it appears that the expenditure of public funds in sufficient amounts to complete all major and secondary structures is required. A policy to purchase a considerable acreage of the land involved is necessary.

The project is admirably located to serve its objective. It irrigates land in five rural municipalities. Transportation facilities give direct connections to all principal markets in western Canada. To the west and east there are some 2,000,000 acres of land suitable for grazing only; to the south and north are 500,000 acres of excellent cereal growing soil. The essentials necessary to utilize production on the project are at hand, while irrigation is required to stabilize production on the adjacent dryland.

THE REACTION OF RURAL MUNICIPAL COUNCILS

During the winter of 1945-46, members of the Land Use Committee met each of the Rural Municipal Councils within the study area. At these meetings a presentation was made of the objectives of the study, the information available for Land Use planning, and the

share which all municipalities had in the program. Interest in the study was expressed at all meetings, although in some the interest was greater than in others. In addition, each council was asked to study its municipality, and to bring existing Land Use problems to the attention of the Land Use Committee. This section deals with the ideas of the several councils, and their recommendations relating to the development of more pasture projects, an enlarged water conservation program, and better farm cultural practices.

More organization in pasture development is needed in all municipalities. Few of the councils expressed themselves as being in favour of large Community Pastures, except where these are established already. The reason for this expression of opinion is related to the conditions within most of the municipalities where land types do not lend themselves to large pasture development. However, small pastures are desired whether they be managed by municipal councils, grazing associations, groups of neighbouring farmers, or by individuals. Specific recommendations to obtain more pasturage include a land purchase program by the Dominion and Provincial Governments to operate when other means of obtaining land fail; a policy to assist local organizations to reseed abandoned farm land and depleted pasture; a continuance of the small water development policy; and an extension of P.F.R.A. pasture construction service to smaller sized units than those now being developed. The establishment of smaller sized community or neighbourhood pastures is logical and necessary. Not only are farmers desirous of seeing such developed, but the natures of large areas of land do not fit into the pattern of large sized pastures. There are numerous areas of from two to five or six sections in extent where no planned use is being made of the resources at present. Areas of this size are less than required for P.F.R.A. Community Pasture development, but because they are adjacent to farms they make logical sites for neighbourhood or co-operative enterprises.

Water conservation recommendations include those that are being used at present, as well as others. Drainage problems exist in certain municipalities, particularly in Lakes Chaplin and Johnstone areas and along Wiwa and Thunder Creeks. The councils requested that surveys and experimental work be undertaken to indicate how more production can be obtained from such lands. Many councils requested that detailed water conservation surveys be commenced in their municipalities so that spring flood water can be utilized to a greater degree than at present.

Other problems, which councils are concerned about, include weed control, insect and rodent control, wind erosion, wood lot planting, better co-ordination of agricultural extension services and more complete agricultural planning generally. All councils requested Land Use planning surveys of their municipalities, because this service brought out problems that could be studied. The Swift Current Rural Municipal Council wishes to establish a seed cleaning plant, while the Coulee Council wishes to start wood lot plantings. These councils requested guidance to plan and establish the projects.

One factor affecting the organization of a Land Use plan by the municipal officers is the fact that no technique is available to guide the program. When discussions have been held with these men, their replies are usually the same. Summarized, these replies are, "Land Use planning is excellent, it is necessary, but how do we go about doing it". The phase of the problem which appears to be hardest to grasp is the preparation necessary for a long-time plan which may involve anywhere from 5 to 50 years. Matters of immediate concern can be and are being handled efficiently and expediently by municipal officers. However, when the plan envisions changes of Land Use, which involve planning for years ahead, the officers require and have requested guidance. The Committee recommends that a guide for Land Use planning be prepared and made available to those concerned with such work.

XI — Recommendations

Since the Land Use Committee was organized much has been accomplished. The Committee feels able as a result of studies made to proceed to make recommendations for an action program in the areas where detailed work has been done. The recommendations made resolve themselves into two groups, namely, those dealing with the 16 municipality study area and those dealing with the future Land Use program of the province as a whole.

RECOMMENDATIONS FOR THE 16 MUNICIPALITY STUDY AREA

The Committee has undertaken to do a comprehensive and detailed study of seven of the 16 municipalities. The results of such study can only come after an action program has been developed to put the knowledge gained into operation. The Municipal Councils have been in full co-operation with the Committee and are prepared to assist in any way they can to initiate an immediate Land Use program. Therefore, the Committee feels that an immediate action program is necessary and makes the following recommendations:

1. **Seeding Program**—Whereas lands seeded to cultivated forage crops (particularly crested wheatgrass and crested wheatgrass-legume mixtures) produce higher yields of forage than do native grass pastures, and there are large acreages of abandoned farm land, depleted native pastures and cultivated farm lands classified as submarginal for wheat production within the 16 municipalities, the Committee recommends:
 - (1) That the Provincial Government and the Councils of the Rural Municipalities arrive at an agreement whereby the duties and responsibilities of both administrative bodies are defined to organize a reseeding program.
 - (2) That all Dominion and Provincial agricultural services be co-ordinated under the direction of an officer appointed by the Provincial Department of Agriculture (hereinafter referred to as the Project Supervisor, and that this man act under the Agricultural Representative Service).

- (3) That the Project Supervisor co-operate in every way with the Municipal Council.
- (4) That the land tenure classes listed below under sub-sections (A), (B) and (C) be assisted as recommended:
 - (A) Abandoned farm lands owned by Crown agencies and municipalities neither leased nor rented and which are producing weeds at present:
 - (a) That these lands be reseeded to grass.
 - (b) That the costs of seed and seeding be borne according to the agreement between the Provincial Government and the Rural Municipality concerned.
 - (B) Abandoned farm lands now owned by Crown agencies and municipalities leased under long term tenure by resident farm and ranch operators, and which are producing weeds at present:
 - (a) That these parcels be reseeded to grass.
 - (b) That the costs of seed and seeding be borne by the lessee.
 - (c) That no rentals be charged the lessee until a stand of grass is obtained.
 - (d) That consideration be given to a policy which will forego collection of provincial and municipal taxes until a stand of grass is obtained.
 - (e) That the determination of the stand be the responsibility of the Agricultural Conservation and Improvement Committee together with the Project Supervisor.
 - (C) Privately owned farm and ranch land used for pasture purposes by resident operators:
 - (a) That these lands be reseeded.
 - (b) That the costs of seed and seeding be borne by the resident operator.
 - (D) In the case of sub-sections (A) and (B) above that such lands seeded to grass be declared submarginal for wheat production, and that all P.F.R.A. payment be waived.
 - (E) That the reseeding program be organized in relation to a sound Land Use plan.

2. Community and Neighbourhood Pastures—Because there is insufficient grass available to provide grazing for the present livestock population, and because more livestock are needed to obtain greater diversity of production and farm security, while at the same time there are tracts of unused native pasture and abandoned farm land, the Committee recommends:

- (1) That land unsuitable for annual crop production be organized into either (A) Community Pastures, or (B) Neighbourhood Pastures:

(A) Community Pastures:

- (a) That the sites recommended in this report for Community Pasture development be investigated.
- (b) That these be constructed on a Community Pasture basis.
- (c) That the Agricultural Representative Service and the Agricultural Conservation and Improvement Committees of the municipalities concerned co-operate in the preliminary planning of pasture development.

(B) Neighbourhood Pastures:

Many tracts of land, unsuitable for cereal production, are too small for development under the P.F.R.A. Community Pasture Program. Where such lands occur, it is suggested that they be developed into Neighbourhood Pastures. It is recommended that representatives of the Agricultural Representative Service and the Agricultural Conservation and Improvement Committee in the municipalities concerned work together to plan these pastures.

It is suggested that consideration be given to the construction of economical fences around such pastures, including the use of bluestone treated poplar, spruce and pine posts, as well as the use of fewer wires than the number required by statute for Community Pastures. Further, it is recommended that a policy be formulated whereby construction and management of these pastures can take advantage of the following services:

- (a) The P.F.R.A. reseeding program.
- (b) The P.F.R.A. water development program.
- (c) The L.U.B. land control program.
- (d) The bull policies of the Dominion Production Service.

3. Crop Planning—As spring soil moisture conditions are very important criteria to determine which crops should be grown on cultivated lands in any particular year, and because these conditions should be more fully taken into consideration by farmers in the planning of their crops for that year, the Committee recommends:

- (1) That a soil moisture survey be carried out by the Agricultural Conservation and Improvement Committees of the 16 municipalities, and that the Agricultural Representative

Service direct this survey so that the results can be discussed with farm operators within these municipalities for the purpose of crop planning in 1947 and subsequent years.

4. Soil Erosion—Because erosion by wind and water are problems which are ever present, the Committee recommends:

- (1) That the control of erosion be given due consideration in planning for crop production, and that established erosion control methods be practised. In view of the seriousness of the problem, it is recommended that all agencies providing services to agriculture advise farmers and farm organizations about methods of soil erosion prevention, and the recommended methods of control where the condition has become a menace to agriculture. The most effective method of erosion prevention on any soil type is to cultivate the land at speeds recommended for each implement. Excessive speeds pulverize the soil and bury trash covers, thus preparing the land for erosive forces to act.

5. Water Development—Because soil moisture is the principal limiting factor affecting crop production, and large volumes of water are lost in the form of run-off each year, and because dams and dugouts for stock-watering purposes are needed to utilize the grasslands efficiently, and there are numerous sites where run-off water could be utilized to increase soil moisture supplies and thus increase production and stabilize farm living, and the run-off water resource is the least developed of the agricultural resources in the area, the Committee recommends:

- (1) That water resource and water conservation surveys and investigations be completed as soon as possible for the specific purposes of:
 - (a) Determining the best use of the run-off water on every farm.
 - (b) Determining the possibilities of spring-flood irrigation projects along the Swift Current, Wiwa and Thunder Creeks, the Wood and South Saskatchewan Rivers, as well as on the low lying lands adjacent to and between Lakes Chaplin and Johnstone.
- (2) That areas be selected where detailed investigations in the use of run-off water can be studied; three locations are cited in the body of this report.
- (3) That reconnaissance surveys of run-off be made during the spring-flood season so that personnel engaged in water use studies will be able to observe and understand the nature of run-off.
- (4) That the water development program be directed under the Agricultural Representative Service.

6. Land Control—Because the control of absentee owned land is vital to a Land Use program and the formulating of Land Use policies, the Committee recommends:

- (1) That, if title to such parcels cannot be secured under existing legislation, a policy to purchase such lands be formulated.
7. **Economic Studies**—Whereas such study has been carried on in regard to economic sizes of grain farm units, grain farm-livestock units and livestock units, the Committee recommends:
 - (1) That as soon as information on the sizes of economic units is available, the results of such studies be developed to encourage farmers to obtain economic farm or farm-grazing units.
8. **Irrigation Development, Swift Current Project**—Whereas the development of this work is vital to the whole Land Use plan in the 16 municipalities, and whereas Crown lands on the Swift Current project belong to the province and constitute a basis for making proper use of the water now available, and whereas there is much water available under this project which is not being used, the Committee recommends:
 - (1) That steps be taken to have producers organized under provincial statutes for irrigation development purposes.
 - (2) That a follow-up program be instituted for this development on land already under irrigation.
 - (3) That immediate action be taken to provide flood control at the Highfield dam and other points to avoid excessive flooding of Rush Lake flat, lack of which may prevent the use of land there in 1948 and in subsequent years until flood control facilities are developed.
 - (4) That Dominion and Provincial agencies be requested to get together for the purpose of completing irrigation canals, laterals, drainage systems, and land levelling and development, so that the proper use can be made by the farmers of water which is stored at present and which will be stored in the future.
 - (5) That a program of land levelling and land preparation be organized whereby equipment and services of Governments and Municipalities can be co-ordinated in a plan that will serve the farm operator on a cost basis.
 - (6) That in the formulation of any irrigated land settlement policy the Agricultural Conservation and Improvement Committees be consulted.
 - (7) That Crown land developed for irrigation on the Rush Lake flat be made available for distribution to farmers in the Excelsior and adjacent municipalities.
 - (8) That a committee be appointed to study the possibilities of special crop production, including such crops as vegetable seed, oil seed plants, vegetables, grasses and legumes for seed, hay and meal, as well as sugar beets and other annual crops.

9. Supplemental Feeding of Market Cattle in the Rural Municipality of Excelsior No. 166—Whereas this rural municipality has had a community pasture during the summer months for the grazing of some 700 head of cattle owned by adjacent farmers, the Committee recommends:

- (1) That a project be undertaken to increase the market weight and quality of the dry cattle by supplemental feeding on grass at the proper season of the year, the details of such a project to be worked out with the Agricultural Conservation and Improvement Committee in conjunction with representatives of the Agricultural Representative Service.

10. Aerial Surveys—Whereas vertical aerial surveys would expedite the carrying out of all surveys and would be of great value in speeding up land classification work, the Committee recommends:

- (1) That consideration be given to having vertical aerial photographs taken over the municipalities where this has not been done.

11. Forestry Surveys—Whereas the Rural Municipality of Coulee No. 136 has requested that consideration be given to tree planting in that municipality, the Committee recommends:

- (1) That the Forestry Station at Indian Head be asked to conduct a survey in this municipality relative to establishing a tree planting association there.

12. Size of Farm—Whereas many farms are too small to produce efficiently, and whereas many farms are not consolidated but include parcels of land which may be from 10 to 15 miles away from the farm headquarters, the Committee recommends:

- (1) That policies be introduced which will encourage farmers with small holdings to increase the size of their properties.

(NOTE: This recommendation applies to the Rural Municipality of Chaplin and other municipalities where Crown lands are unoccupied. In the municipalities at the west side of the study area, there appears to be very little unoccupied land. It is worthwhile noting that the average size of a farm in Chaplin and Webb Municipalities is approximately one and one-half sections, of which nearly one section is deeded land and the balance leased and/or rented. In the Rural Municipality of Chaplin the cultivated acreage per farm is 384 acres, while in the Rural Municipality of Webb nearly 600 acres of each farm are cultivated).

- (2) That provisions of The Provincial Lands Act be used to expedite land exchange so that farmers can consolidate their holdings.

(NOTE: It is not recommended that consolidation be forced on farm operators. Many farmers prefer to have their cropland scattered so that they can obtain

benefits from local showers and escape hail, frost and insect damage. Most farms are equipped to cultivate scattered holdings. However, some farmers would like to consolidate their properties).

- (3) That sections dealing with land acquisition, control and disposal, be made comparable in both Provincial Statutes regarding lands and The Rural Municipality Act.

GENERAL RECOMMENDATIONS

The foregoing recommendations have been made in connection with work undertaken in the area under study. Having in mind that Land Use problems are being encountered throughout the province, the Committee makes the following general recommendations:

- 1. Future Land Use Program**—Whereas it is felt by the Committee that problems of Land Use will become of increasing importance as time passes, and whereas many areas of the province have serious Land Use problems at the present time, the Committee recommends:
 - (1) That a Central Land Use Committee be formed to guide the Land Use program for the whole of the Province of Saskatchewan, and that sub-committees be formed by it from time to time to conduct Land Use studies in specific areas.
- 2. Financing Personnel**—Whereas the Committee feels that it is sound practice to develop an overall Land Use program, and whereas greater numbers of trained personnel will be required in such a program, the Committee recommends:
 - (1) That consideration be given to the financing of such a program and provisions be made to obtain the necessary personnel and facilities.
- 3. Co-ordination of Services**—To achieve the results in a sound Land Use plan by the proper expenditure of public monies, the greatest co-ordination of agricultural services is essential. The Committee recommends:
 - (1) That a special meeting be called immediately of all services concerned to consider the directing of those services.
 - (A) Through the organized services now outlined in The Agricultural Representatives Act in order to avoid independent activity and unnecessary expenditure of money.
 - (B) By co-ordinating the appropriations of all services toward a sound action program in better Land Use.
- 4. Guidance for Land Use Planning**—It has been found that many municipal officers are not acquainted with the procedure for Land Use planning. Thus the Committee recommends:
 - (1) That publications be prepared and made available to those concerned, relating to the purposes, procedure and organization required to obtain better use of land by planning.

XII — Appendix 1

RECOMMENDATIONS REGARDING EXPERIMENTAL WORK IN THE SOUTHWEST IN 1921

In the report of the Better Farming Commission (1921) there is a list of questions about farming practices. These questions were those which farmers asked the Commission to have answered, because they appeared to be of paramount importance to successful farming at that time.

During the 25 years since the Commission presented its report, experiments have been conducted to answer that list of questions, as well as many others. Those questions can be answered today.

Certain of the questions can be answered very easily, because the principles which are involved apply to the entire area. Answers to others have to be modified, because local soil and climatic factors influence the crops that can be raised and the type of cultivation to be practised. Certain other questions can never be answered completely, because each new crop, each new disease or pest, each new demand on the part of the buying public influences the relation between crops and methods. A few of the questions have no significance today because the problems which they depict were associated with crops, machinery and methods that are outmoded.

It is of interest to note that so many problems that were common 25 years ago are in the forefront today. However, the phase of the problem is often different to what it was two decades ago. Then the greatest problems concerned production practices and distribution of that production; now the dissemination, co-ordination and application of research and experimentation is of equal importance. These questions illustrate the fact that many of our agricultural problems will be the same in the future as they are today, also that changing demands and different varieties of crops will necessitate modified or different answers.

We are submitting for your approval the several questions asked the Better Farming Commissioners, and the answers that have been secured after 25 years of research and experimentation. The answers given are general and deal with principles rather than details. A vast amount of information pertaining to these questions is available to farmers, and greater detail can be obtained by request.

Dominion Experimental Station,
Swift Current, Sask.

1. What is the rainfall in my locality?

Records of precipitation for Swift Current have been kept since the year 1886.

Up to and including 1937, the precipitation data were obtained from the meteorological station at Swift Current. From 1937 to 1945 it was obtained from the Dominion Experimental Station records.

The average precipitation at Swift Current for the past 61 years is 14.94 inches (1886-1946 inclusive).

The average for April, May, June and July for this period is 7.79 inches.

The highest yearly precipitation of 24.55 inches occurred in 1891 and the lowest of 8.26 inches occurred in 1937.

During the 61 years that records have been taken, there have been 36 years when the seasonal precipitation was less than average, while during 25 years it was greater than average. Average annual and seasonal precipitation records obtained at Swift Current and from Substations of the Dominion Experimental Station, Swift Current, are presented in Table 24.

TABLE 24
Precipitation Records

Station	No. of Years of Record	Average Precipitation	
		Annual	Seasonal*
Bracken.....	10	13.38	7.19
Carmichael.....	11	15.41	7.55
Fox Valley.....	12	9.17	4.42
Gravelbourg.....	11	12.92	7.33
Kincaid.....	11	13.90	7.75
Limerick.....	11	14.29	7.84
Riverhurst.....	12	10.70	6.06
Shackleton.....	8	12.98	6.65
Shaunavon.....	12	11.38	6.48
Swift Current.....	61	14.94	7.79
Tompkins.....	10	13.94	6.56
Tugaske.....	12	14.25	7.88
Valjean.....	12	13.25	6.74

*—Seasonal rainfall includes that for April, May, June and July.

Precipitation records at Swift Current are illustrated on the chart following. It will be noted that the chart illustrates both annual and seasonal precipitation for the 61 years that records have been secured.

2. What are the prospects with regard to frost?

During the 24-year period from 1923 to 1946, inclusive, the latest spring frost of 32 degrees Fahrenheit, or less, occurred on June 12th, 1942, while the earliest fall frost occurred on August 7th, 1927. The shortest frost-free period was in 1928 and lasted only 75 days; the longest occurred in 1940, extending for a period of 145 days. The average length of frost-free season is 108 days.

PRECIPITATION AT SWIFT CURRENT 61 YEARS 1886-1946

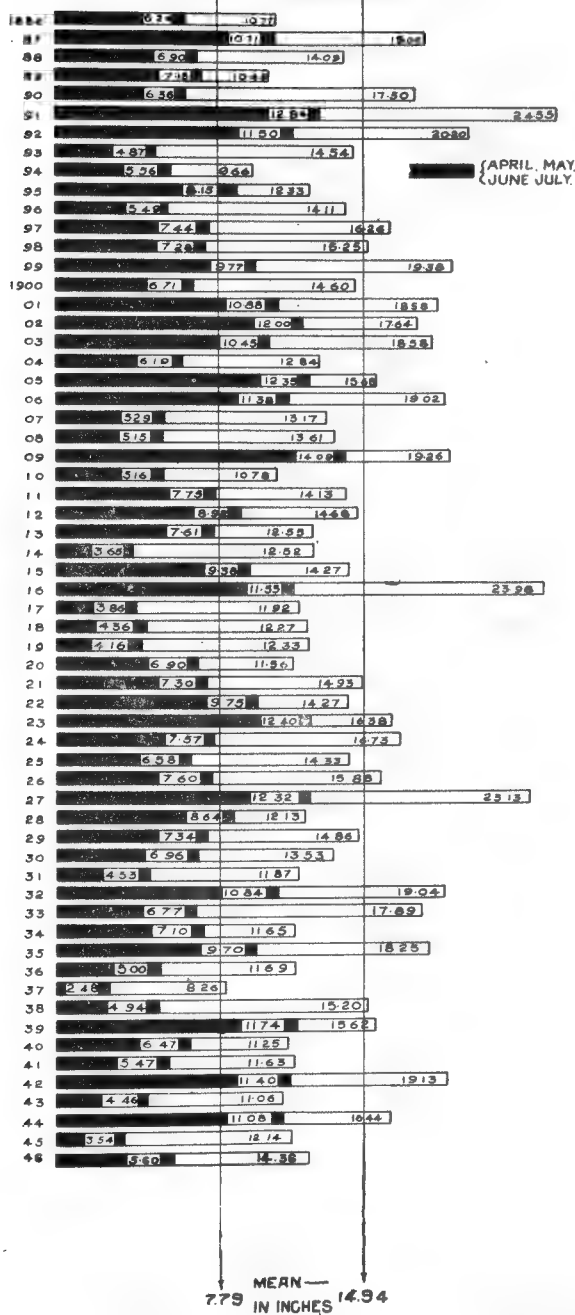


Plate 2. Precipitation at Swift Current, 61 years 1886—1946.

Table 25 summarizes the data on frost-free studies.

TABLE 25
Frost-Free Periods from 1923 to 1946, Inclusive

Length of Frost-Free Period	No. of Years Occurrence
From 75 to 90 days.	4
From 91 to 100 days	4
From 101 to 110 days	6
From 111 to 120 days	5
From 121 to 140 days	3
Over 140 days ..	2

3. What general type of soil is found in the district where I propose to locate?

The soils of the area under discussion have been mapped by the Department of Soils, University of Saskatchewan, in co-operation with Experimental Farms Service, and the results published in Soil Survey Report No. 12. A more detailed soil survey has been made of Rural Municipalities Nos. 133, 134, 163 and 164, and the results published in Soil Survey Report No. 11.

An examination of the soils map shows that the soils range in texture from a heavy clay to drifting sand, with the major portion being classed as loam. As moisture is the first limiting factor in crop production in the area, the productivity of the various types of soil is closely linked with their water holding capacity.

The most productive soils are the Sceptre clay and heavy clay found chiefly along the South Saskatchewan River and the small area of Regina heavy clay on the east side of the area. These soils are free from stones and the topography is very favourable.

The Fox Valley and Haverhill clay loams are rated second in productivity and are classed as good agricultural lands. The area of Echo clay loam in the northeast corner of the area is not rated as high as the other clay loam because of a hard impervious layer fairly close to the surface. There is considerable variation in the soils of this area and, although the topography is favourable, the presence of stony areas, blowouts and poor subsoil lowers its value.

The loam soils, which cover approximately 50 per cent. of the area, are classed as fair to good agricultural land except in the areas of rolling to hilly topography. The area of Cypress loam in the southwest corner is probably equal to the Fox Valley and Haverhill clay loam in productivity. This area is relatively free from stones and of good topography.

The loam soils, especially in the areas of rolling to hilly topography, contain numerous stones and small areas of sand and gravel. As the water holding capacity of the loam soils is less than the heavier soils, they are more subject to drought. The areas of rough topography can be classed only as grazing land.

The sandy loams and sands are definitely not suitable for cultivation, for they are very subject to drought and erosion. Such areas should be left permanently in grass.

4. What crops can be profitably grown in Southwestern Saskatchewan?

Wheat, oats and barley are the most important grain crops grown, while flax and fall rye are suitable in certain areas. Crested wheatgrass is the highest producing perennial forage plant, although brome produces higher yields within the Cypress Hills region. Mixtures of grasses and alfalfa yield greater amounts of forage than grasses alone.

5. What yields can be expected through a series of years?

The amounts of grain or hay produced by the different crops show great variation from year to year. The data in Table 26 show the long time and 7-year average yields obtained at the Dominion Experimental Station, Swift Current, for the several crops listed.

TABLE 26
Yield Records of Cereal and Forage Crops on Dryland

Crop	Long Time Average	7-year Average 1939-45
Wheat on fallow...	22 yrs. — 16.2 bus.	17.5 bus.
Wheat on stubble	22 yrs. — 9.2 bus.	8.8 bus.
Oats on fallow.....	12 yrs. — 47.8 bus.	48.3 bus.
Oats on stubble.	7 yrs. — 35.6 bus.	35.6 bus.
Barley on fallow...	12 yrs. — 32.8 bus.	32.0 bus.
Barley on stubble	7 yrs. — 21.7 bus.	21.7 bus.
Fall rye on fallow.	7 yrs. — 8.3 bus.	8.3 bus.
Fall rye on wheat stubble	9 yrs. — 3.8 bus.	3.9 bus.
Flax on fallow.	4 yrs. — 5.7 bus.	
Flax on wheat stubble	4 yrs. — 4.2 bus.	
Crested wheatgrass	7 yrs. — 0.53 tons	0.53 tons
Brome grass	7 yrs. — 0.47 tons	0.47 tons
Alfalfa.	7 yrs. — 0.84 tons	0.84 tons

6. What variety of wheat, oats, barley, alfalfa or other crop is best for my locality?

New varieties of cereal and forage crops are constantly being produced that are superior to existing ones for some

particular area. This process may be expected to continue indefinitely. New varieties are necessary because of changing conditions. Different insect and disease pests are constantly appearing, soils become less fertile due to long periods of cropping, different harvesting methods are adopted and consumer demand changes. As a result the production and testing of new varieties is a never ending job.

The list of recommended varieties is reviewed annually by the Saskatchewan Cereal Variety Committee, which functions under the Advisory Committee on Agricultural Services. The results are published in January of each year in a booklet entitled "Recommended Varieties of Grain Crops for Saskatchewan". Copies may be had from any of the Agricultural Services.

For this year the recommended varieties for the area in question are:

Wheat	Rescue
Oats	Ajax
Flax	Royal
Barley	Titan
Spring rye	Prolific
Fall rye	Dakold
Alfalfa	Ladak
Crested wheatgrass	Fairway
Brome	Parkland

Rescue is a new wheat variety developed at the Dominion Experimental Station, Swift Current, Saskatchewan. It is resistant to sawfly attack and thus is recommended for use in districts where sawflies are causing losses. Rescue will yield nearly as heavily as Thatcher even in years when sawflies are not present, and it is equally resistant to stem rust. Tests indicate that Rescue is about one day later maturing than Thatcher. Because it is inferior in quality than Marquis, it is not eligible for grades above No. 3 Northern. It is expected that sufficient seed will be available for general distribution in 1948.

7. What methods of tillage can I use to best advantage?

The method of tillage to be used depends on the type of soil, the amount of trash and the amount of soil moisture present. The object of all tillage should be to conserve moisture and to create a soil condition that reduces the danger of possible soil erosion. When sufficient trash is present, it is advisable to till the soil in such a manner so that the trash will be kept anchored at the surface of the soil. When the trash cover is very sparse, plowing may be resorted to in order to obtain a lumpy condition of the surface of the soil to prevent possible wind erosion.

8. What is the best method of surface cultivation?

There is neither a best method nor a best implement for surface cultivation over the entire district, because tillage

methods vary with the soil type and with soil moisture conditions. Blade machines are very effective implements to kill weeds and to anchor the trash at the surface, but they will not do effective work on all soil types or under all conditions of soil and atmospheric moisture. The one way disk is the most generally used implement for surface cultivation, and works effectively under nearly all soil conditions; however, care needs to be exercised when it is used because it can and does produce conditions that lead to soil drifting. Duckfoot cultivators, disk harrows and rod weeder are popular and effective in certain districts. These implements, either alone or combined, have proven to be most suitable for surface tillage. They kill weeds, conserve moisture and, if used intelligently, will retard or prevent soil drifting. The choice of implement depends on the job to be done, the soil type, and the soil and atmospheric moisture conditions.

9. What crop can I use as a summerfallow substitute?

There is no real substitute for well prepared summerfallow in Southwestern Saskatchewan. However, if forage has to be grown on cultivated land for feed for livestock, it may be profitable to grow a crop for feed purposes on a portion of the land to be summerfallowed, even though lower yields are produced in the following grain crop.

The results obtained from experiments conducted on this station are shown in Table 27.

TABLE 27
Wheat Yields Following Summerfallow Substitutes

Fallow Substitutes	1937-45 Yield of Sub- stitutes Per Acre	1938-45 Wheat Yields After Substitutes
Fallow (check)		18.8 bus.
Cover crop (wheat seeded in July)		17.5 bus.
Wheat for grain	7.7 bus.	11.2 bus.
Fall rye for grain	1.8 bus.	14.6 bus.
Corn for fodder.. . . .	0.8 tons	15.6 bus.
Early oats for hay	0.7 tons	15.5 bus.
Early barley for hay	0.8 tons	15.9 bus.
Late oats for hay	0.8 tons	13.0 bus.
Late barley for hay...	0.7 tons	14.0 bus.
Sweet clover for hay	0.0 tons	15.3 bus.

10. How can I secure a stand of sweet clover, alfalfa, brome grass, or other pasture, or meadow grass?

Securing good stands of perennial forages depends on two factors, firstly, time of seeding and secondly, depth of seeding. For grasses, the best times to sow are about the 1st of September or immediately before freeze-up. Early spring seedings are often successful, but usually better stands are obtained from fall sowings. Alfalfa and sweet clover should be seeded either immediately before freeze-up or in early spring. Seedings should not be over one inch in depth, and shallower sowings ensure better stands. Drilling is better than broadcasting.

11. What are the best methods of growing these crops, whether broadcast or in rows and, if in rows, how far apart shall I sow the rows, and shall they be sown as single, double or triple rows?

Experiments have shown that perennial forage crops should be seeded in single rows one foot apart when grown for hay production. Six-inch spaced single rows are recommended for pasture seedings. Drilling is recommended in all cases.

12. What rate of seeding per acre shall I use for each crop?

Table 28 summarizes information on rates of seeding perennial forage crops.

TABLE 28
Rates of Seeding in Pounds Per Acre

Crop	Pasture	Hay
Brome	12	7-8
Crested wheatgrass	10	5-7
Alfalfa	10	5-6
Sweet clover	10	5-6

13. How deep shall I sow each crop for best results?

Experiments show that seedings of not over three-quarters of an inch produce better stands of alfalfa, sweet clover, crested wheatgrass and meadow grasses than do deeper seedings. Satisfactory stands of brome are obtained when seedings are up to one inch in depth. On heavy soils somewhat shallower seedings are recommended, whereas slightly deeper seedings may give equal stands on sandy land.

14. How deep shall I sow my cereals?

Three factors determine the proper depth of seeding, the kind of seed, the depth of moisture and the firmness of the seed bed. Seed should be seeded into moist soil. A depth of from 2 to 3 inches is recommended for the seeding of wheat, oats, barley and rye.

Better stands of flax are obtained by seedlings of less than two inches, providing the seed is placed in moist soil. Better stands of small seeded crops are obtained from shallow seedlings.

15. How deep shall I plant my potatoes?

Potatoes are a staple food, and as such, warrant more care in the selection of seed, and the choice of a site than is usually given. Under dryland conditions the potato crop should always be placed on summerfallowed land. Rows need to be spaced at least 42 inches apart with plants from 15 to 18 inches apart in the rows. It is desirable to select an area which will receive spring run-off or run-off from heavy summer rains. However, the crop should not be placed on a very low lying area because it can be lost through flooding or lack of drainage during wet seasons.

Seed pieces are generally planted from 3 to 4 inches deep, depending on the soil type. Plantings of three inches are recommended for heavy soils, and up to four inches on light soils. Hilling is not recommended under dryland conditions.

Varieties recommended for dryland production are:

White Irish Cobbler, Gold Nugget.

Pink Early Ohio, Warba.

Red Bliss Triumph.

Under irrigation the rows should be about 36 inches apart. They need to be furrowed and well hilled. Lighter textured soils are preferable to heavy soils, because of better aeration and drainage on the former. Planting deeper than three inches is not recommended. Seeding should be completed by the 10th of May. Irrigation should start prior to the flowering period and be ended by July 15th. Frequent light irrigations are preferable to infrequent heavy applications. The Netted Gem variety is recommended because it produces a better quality potato than any other variety under irrigation.

16. What is the best silage for my district?

Silage made from corn, sunflowers, oats and other cereals have been used. All make good quality ensilage, although corn is preferable to the others.

Silages are expensive feeds, that is a ton of silage costs more to produce and process than does a ton of other forages, also they do not have the heat content that other crops possess and which is necessary for wintering stock. Silage does stimulate milk flow. Consequently, silage is desirable for dairy cattle during the winter, but is less useful for wintering or fattening beef animals.

17. Shall I list, drill, check or double list my corn or sunflowers?

The cultivation of these crops depends on the machinery available. Any equipment, which will do the job and conserve moisture is recommended. Seeding in three-foot rows with a standard drill is the best practice. Sunflowers are not recommended as a crop except for oil production.

18. How far apart shall I plant rows of sunflowers in order to leave the ground in shape for a crop to follow?

Sunflowers are not recommended as a crop for use in a rotation, because they remove all available moisture from the soil. The only satisfactory rotation from a crop yield viewpoint is a two-year rotation of summerfallow and sunflowers.

Sunflowers planted in single rows across fields have been used as windbreaks to control soil drifting. However, they are less effective than trash cover for this purpose. The effective distance between rows for windbreak purposes varies with the soil type, and ranges from 2 to 8 rods.

19. What rotation of crops can I follow with profit and with due regard to the effect on my soil?

The three-year rotation of fallow-wheat-wheat has produced more wheat on a given area than the two-year rotation of fallow-wheat at this station. The crops on stubble land in years with low seasonal precipitation are usually extremely light. A three-year rotation that included oats or barley with wheat and summerfallow has been more profitable during the past few years than have the rotations in which oats or barley were not included. The grasses appear to have no place in the short rotations practised in this area, because of the length of time required to obtain a stand of grass, and the relatively low yields of hay which are secured when a stand is obtained. Furthermore, grasses do not conserve moisture for future crops, such can be done best by summerfallow. Where soil erosion cannot be controlled by cultural means, the land should be seeded to a permanent grass cover.

20. What can I do to keep my soil from drifting?

Soil drifting is most prevalent on summerfallow land during the spring and throughout seasons of low precipitation. To keep land from drifting, an attempt should be made to establish one or more of the following objectives:

1. The reduction of wind velocity over the surface of the soil by trash covers or by alternate strips of fallow and summerfallow.
2. The establishment of a cover to prevent the soil being exposed to the wind, such as cover crops.

3. Increasing the size and stability of granules and clods by cultivation or plowing.

4. Trapping of moving soil particles.

Sandy land that is very liable to drift should be seeded down permanently to grass for hay or pasture.

The enumerated objectives can be attained best by the cultural practices recommended in the answers given to other questions in this report.

21. What can I do to bring a certain alkali spot under cultivation?

This depends on the nature and amount of the alkali present, the soil moisture conditions and the possibilities of drainage. Each location is an individual problem. In general, these areas should be seeded to perennial forage crops and kept in crop. It is necessary to use alkali-tolerant crops, such as slender wheatgrass, sweet clover, brome, crested wheat grass and alfalfa. A mixture of several of these crops is better than any one seeded alone. No chemical treatments are of value, but applications of barnyard manure will help materially to improve the tilth of many alkali types. The establishment of drainage is nearly always essential.

22. I understand that barnyard manure is considered the best fertilizer in the old countries, but how can I use it on the dryland in my district without drying out the crop?

If we were willing to prepare barnyard manure by the use of compost piles, much of the drying effect would be overcome. However, it is seldom that a farm has sufficient manure to use it over the entire cropped area. Consequently, it is recommended that manure be reserved for special purposes, including gardens, centres where soil drifting starts, alkali areas and on native and cultivated pastures. Manure, relatively free from straw or manure that has rotted in wet piles, has less drying effect than that which contains a lot of straw or is fresh.

Gardens which receive an application of manure should be summerfallowed one year after application. Applications of from 6 to 14 tons per acre are recommended.

23. Can I use my surplus straw to advantage as a mulch for my winter rye or my grass fields?

The application of two tons of straw to winter rye or grass fields will not do any harm. The amount of good that it will do is questionable. If the grass fields are to be cut and raked for hay, a good deal of the straw would be raked up, making an inferior feed. In this area, if the straw is not needed for livestock, the crop could be combined and the straw spread evenly over the land where it would possibly do as much good as any place with much less expense in

spreading it on another area. No experiments have been carried here to determine the value of a straw mulch for increasing yield of grain of winter rye.

24. Can I plow under any green crop to help keep the fibre in my soil without too great a cost?

Moisture is the limiting factor in crop production in South-western Saskatchewan. Any crop grown uses up the moisture that is necessary for the growth of the following grain crop. It is estimated that the amount of fibre in a green crop is approximately equal to that obtained in the straw of a grain crop. Except under irrigation no crop should be plowed under. Plowing it under leaves an air space and the land tends to dry out more rapidly than it would if worked into the surface.

25. Can I use phosphates or any other commercial plant food to advantage?

An experiment has been conducted over a period of years to determine the advantages of using commercial fertilizers, as well as manure. The results of the study are summarized in Table 29.

TABLE 29

Yields Obtained From Fertilized and Unfertilized Fields

Treatment on Summerfallow	Yield in Bushels Per Acre	
	1940-45	Long Time Average
No fertilizer.	22.1	17.7
Complete fertilizer 9-27-9	22.2	17.9
Ammonium phosphate 2-20	21.8	17.5
Ammonium sulphate, 21% N.	21.1	17.0
Triple superphosphate 0-43-0	22.4	17.8
Ammonium phosphate 11-48	21.8	17.4
Manure, 10-12 tons per acre.	23.5	..

These results indicate that manure is the only fertilizer that produced a significantly higher yield than fields which had no treatment. It is of interest to note that the yields of three fields were less than that from the field which had no treatment. No commercial fertilizer has shown that it increases yields in the district adjacent to the Swift Current Experimental Station.

26. If I grow corn, alfalfa, sweet clover or sunflowers, what will I do with the crop?

Uses for the several crops are suggested:

- Corn — Hogging off, cattling off, lambing off, winter roughage, silage, seed production.
- Alfalfa — Winter pasture, pasture for hogs, if grown alone, pasture for sheep and cattle in grass-alfalfa mixtures, hay production, alfalfa meal production and seed.
- Sweet Clover — Pasture, hay and seed.
- Sunflowers — Oil and pasture.

27. I have a bad mess of Russian thistles. What can I do to save myself from their ravages?

Russian thistle is an annual weed that is very tolerant to drought. Fortunately, it seldom causes much trouble when conditions exist which are suitable for growth of cereals. If possible, plan your seedings so that the crop can get ahead of the weeds. Such can be done by early seeding or late seeding preceded by cultivation. Delayed seedings often result in less weed growth than the early plantings. Results show that a strong, vigorous crop will control the growth of Russian thistle.

Today, 1946, other weeds are causing greater losses than Russian thistle. Amongst these the stinkweed or French weed is one of the most troublesome. When dealing with this weed, it is necessary to get a spring kill prior to seeding or the cereal crop will be a failure.

XIII — Appendix 2

The services available to agriculture that are provided by governments and industry are listed as follows:

1. Dominion Department of Agriculture:

- (1) Dominion Experimental Farms Service.
 - (a) Research and experimental studies to obtain information about all phases required to guide a permanent agriculture.
 - (b) Specialized large scale experiments to meet drought and soil erosion problems by the establishment of sub-stations on a co-operative basis with farmers.
 - (c) Soil surveys in co-operation with the University of Saskatchewan.
- (2) Science Service.
 - (a) Surveys and specialized studies relating to entomology, pathology, etc.

- (3) Production Service.
 - (a) Bull loaning policy.
 - (b) Encouragement in sheep and swine production.
- (4) Dominion Economics Division.
 - (a) Economic surveys in co-operation with the Farm Management Department of the University of Saskatchewan.
- (5) Health of Animals Division.
 - (a) Inspection services.
- (6) The Prairie Farm Rehabilitation Act—An emergency program initiated in February, 1935 to assist and ameliorate future problems of drought. The program embodies financial assistance in:
 - (a) Water development for irrigation, stockwatering and domestic water supply on the farm.
 - (b) Resettlement of farmers from submarginal land and the establishment of community pastures for grazing farm livestock.
 - (c) Reconnaissance and detailed surveys of possible irrigation projects and construction of the same.
 - (d) Supplying crested wheatgrass seed for regrassing of abandoned farm lands.
 - (e) Assistance to Experimental Farms in extending experimental work on drought and soil erosion problems.
- (7) Prairie Farm Assistance Act—Assistance to farmers during years of crop failure on a basis whereby the farmers themselves and the nation as a whole contribute to stabilize farm income.

2. Government of Saskatchewan:

- (1) Department of Agriculture.
 - (a) Agricultural Representative Service—to provide guidance to farmers and rural youth for agricultural betterment through Agricultural Conservation Improvement Committees and Boards, and Agricultural Representative Reporter Farm Broadcasts.
 - (b) Lands Branch—Allocating and leasing of agricultural and pasturable Crown Lands and the re-adjustment of submarginal lands.
 - (c) Livestock Branch—Brand and Livestock Inspection Service. Purebred Sire Area, Bull Bonus Policy, Municipal Boar Policy, Advanced Registry Policy of assistance for Swine. Ram Club Policy, Stallion Inspection Service, Stallion Purchase Policy, Purebred Foal Policy.

- (d) Dairy Branch—Herd Improvement Associations, Cow Testing Centres, Frozen Food Locker licensing and inspection.
- (e) Veterinary Service—Bang's disease control and animal disease investigation; Veterinary Service District organization and assistance.
- (f) Field Crops Branch—Assistance Policies for control of water, weeds, soil drifting, insect pests, fruit and vegetable diseases. Distribution of pure seed of cereal varieties and of forage mixtures. Assistance for Feed and Fodder Conservation.
- (g) Poultry Branch—Selection and banding service for chickens and turkeys to encourage production; licences first receivers, wholesalers and hatcheries.
- (h) Apiary Division—Bee Inspection service and assistance.
- (2) University of Saskatchewan.
 - (a) Carrying out of soil surveys and economic surveys in co-operation with the Dominion Department of Agriculture.
 - (b) Extension Services in rural education, including Farm Short Courses and women's work; also Boys' and Girls' Clubs, radio programs and farm bulletins, etc.
 - (c) Special short courses at the University for farm boys and girls.
 - (d) Courses leading to the degree of B.S.A. in the Faculty of Agriculture.
- (3) Department of Natural Resources.
 - (a) Water Rights Branch—The administration of the water rights to provide their equitable use for agricultural improvement.
- (4) Department of Municipal Affairs.
- (5) Department of Education.
 - (a) Saskatchewan Film Board—The provision of educational films in agriculture.
 - (b) Adult Education Division—Educational work in rural areas.

3. Other Services:

- (1) Field Service of Saskatchewan Co-operative Producers Limited.
- (2) Extension Service to the North-West Line Elevators Association.
- (3) Fieldmen of the several land and mortgage companies.

- (4) Searle Grain Company—Crop Testing Plan.
- (5) Veterans' Land Act representatives.
- (6) Fieldmen of lumber companies, livestock vaccine companies, chemical companies, oil companies, etc.
- (7) Literature from financial and insurance institutions.
- (8) Fieldmen of farm machinery and road machinery companies.
- (9) Farm papers and magazines.
- (10) Saskatchewan Wheat Pool.
- (11) CBC Farm Broadcast and other topics of agricultural interest.

XIV — Appendix 3

Common and scientific name of plants referred to in this report:

Common Name	Scientific Name
Alkali grass	<i>Distichlis stricta</i>
Blue grama grass	<i>Bouteloua gracilis</i>
Bluejoint	<i>Agropyron Smithii</i>
Brome grass	<i>Bromus inermis</i>
Common spear grass	<i>Stipa comata</i>
Crested wheat grass	<i>Agropyron cristata</i>
Dropseed grass	<i>Sporobolus cryptandrous</i>
Green needle grass	<i>Stipa viridula</i>
Junegrass	<i>Koeleria cristata</i>
Mat muhly	<i>Muhlenbergia squarrosa</i>
Nuttall's alkali grass	<i>Puccinellia Nuttalliana</i>
Short awned porcupine grass	<i>Stipa spartea</i> var <i>curtiseta</i> .

